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The Question of Palaeolithic Scripts

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At a time when increased attention is paid to the symbolic capacities of early anatomically modern humans and when even the Neanderthals are credited by some with relatively advanced cultural and linguistic competencies (e.g., Arsuaga 2002), a critical examination of the hypothesis that some palaeolithic artifacts could imply more cognitive sophistication than being merely iconic signs of their referents is in order. Several mythical and ritualistic interpretations of rock art have been proposed over the years (e.g., Raphael 1945, Leroi-Gourhan 1982, Marshack 1972, Lewis-Williams 2002). However, the idea that parietal and mobiliary art could actually encode articulate language rather than form loose symbolic configurations is generally not taken into consideration by mainstream prehistorians, even though they increasingly use linguistic terminology such as paradigm and syntax for descriptive purposes. This essay endeavors to assess the plausibility that at least some palaeolithic engraved and painted graphisms could be early forms of scripts, that is, systematic representations of verbal messages. Of course, in the absence of direct evidence regarding the languages or protolanguages that might have been spoken by various palaeolithic populations, there does not appear to be any possibility of actually deciphering a writing code. It is nevertheless feasible to investigate the formal properties of the relevant archaeological record and to test the compatibility of the data with various known writing systems. Demonstrating such a systematicity in the organization of rock art graphisms would be a decisive step toward a reassessment of the cognitive and symbolic capacities of early anatomically modern humans.

1. Preconceptions and preconditions

The controversial issue of the antiquity of scripts must be assessed against the background of the mindset which characterizes rock art researchers. The very phrase “rock art” bears witness to a general preconception according to which the painted and engraved patterns

left by palaeolithic populations on the surface of caves, cliffs, boulders and various smaller objects such as bones, stones and beads are classified as early artistic achievements. “Rock” loosely indicates the nature of their support as distinct, for example, from artificial walls or canvases. But the word “art” carries philosophical, institutional and historical connotations which make a technical definition difficult. Attempts to elude esthetic notions such as style and beauty have not been entirely successful, if only because by and large spectacular color photographs have appeared in countless art book collections and, as a result of this form of popularization, the perception of the painted caves has been to a great extent biased by the lighting, framing and chromatic rendering of these printed reproductions. Even in the descriptive vocabulary of prehistorians metaphorical terms such as “panel”, “frescoes”, “galleries” or “expressionistic”, “naturalistic” and “abstract” styles are commonly used. An artistically educated eye cannot indeed fail to experience an esthetic response in front of monumental patterns and colors which irresistibly evoke some creative movements of the 20th century. The descriptive rhetoric of newly discovered rock art is driven toward the celebratory mode of wonderment which underlines the exquisite rendering of various animals’ appearances, postures or movements as well the compositional mastery exhibited by the use of the natural architecture of rock morphology to create effects of anamorphosis, perspective, and other effective pictorial devices. Modern artificial lighting greatly enhances the esthetic impact of these mostly faunal representations. Lascaux has been commonly promoted as the Sistine Chapel of prehistory. Other, more recent discoveries of palaeolithic painted sites have been celebrated as the dawn of art (e.g., Chauvet et al. 1996, Clottes et al. 1996, Anati 1999).

Actually, this rhetoric of astonishment is rather patronizing toward palaeolithic populations. It is grounded on assumptions of cognitive primitiveness understood not in the descriptive cultural sense but in the evolutionary sense. So powerful are the visual and textual representations of prehistoric humanity which were constructed during the 19th and 20th centuries on the basis of a few skulls and stone tools that the images of the prehistoric brutes which were then drawn and painted on the walls of archaeological museums keep haunting the imagination of the specialists brought up in this conceptual and imaginary context. The emergence of prehistoric humans as symbolic icons of what civilized humanity is not coincided with the colonial discoveries of exotic populations often characterized as “still” dwelling in the Stone Age, thus implying some sort of “delayed evolution”, as if they were living fossils frozen

in time. Technological progress and biological evolution tended then, as they are often nowadays, to be conflated in the self-celebratory discourse of Western "evolutionary" dominance.

Although this latter approach has been radically questioned and is now generally stigmatized on both scientific and ethical grounds in various humanistic disciplines, the power of the earlier 20th century icons continues to permeate the discourse of prehistory. The interpretation of palaeolithic data remains implicitly based on a set of images and assumptions which form the tacit knowledge of the discipline. It seems indeed that, from its inception, prehistory assimilated some rather crude notions of Darwinian evolution which were transferred from the biological to the cultural domain and, as a consequence, the contemporary state of human technologies continues to be set as the standard against which stone age artifacts are implicitly compared. The cognitive abilities of the anatomically modern humans, whose skeletal remains attest their presence over vast areas some 100,000 years ago, are defined by default at the interface of cranial capacity and observable characteristics of lithic implements which bear the marks of artificial modifications. Any features perceived as technical improvements are ascribed to steps in some assumed cognitive evolution rather than responses to changing environmental constraints.

In this context the "artistic" legacy of early humans, which is contemporaneous with "primitive" stone tools, has always been problematic for prehistorians: how to reconcile such highly "artistic" achievements with the level of cognitive competence assigned to the productions of a "backward" technology? A range of hypotheses have been developed in order to account for the numerous engravings and paintings which were found on the surface of caves, shelters and a great variety of objects. Most of these hypotheses are reductive in the sense that they are bounded by some preconceived representations of underdeveloped cognition: irrational beliefs, influence of hallucinogenic plants, or "childish" attempts on the evolutionary path to art. Extreme cases of cognitive reductionism include comparisons with early developmental stages of contemporary human infants (Halverson 1992) and even assimilation to the pictorial productions of autistic children (Humphrey 2002). These ontogenetic or pathological projections on to an assumed evolutionary curve bear witness to the way in which ideologies constrain both perception and rationality. Obviously, in such interpretations, cultural changes are misconstrued as resulting from cognitive evolutionary steps toward an optimal horizon and the short span that

frames our representation of history and prehistory is mistakenly confused with the scale of evolutionary time.

In this epistemological context the possibility that some prehistoric cultures could have developed various graphisms in order to visually encode their spoken languages for a variety of purposes has traditionally been excluded a priori. Linguistic and semiotic knowledge generally is not a part of prehistorians' intellectual baggage. By and large they rely on common sense views of language and accept uncritically the assumed cultural gap that separates prehistorical and historical disciplines. If it is generally agreed that *Homo sapiens sapiens* evolved relatively early the capacity to verbally communicate, the point of departure of this competency is usually debated more intensely among linguists than prehistorians. The latter operate on the assumption that since the invention of writing marks the beginning of history, prehistory is by definition unconcerned by this peculiar kind of artifact. The circularity of this argument has gone unnoticed and nobody, to my knowledge, has denounced its most blatant expression in Leroi-Gourhan' s recurring remarks that many clusters of scriptoid patterns observed in the palaeolithic record could be construed as forms of writing if these populations had been using scripts (Leroi-Gourhan 1992: 333, Demoule 1992: 37-56).

For long, the theory that prevailed ascribed writing to a single innovative event prompted by the necessity of keeping records when the emergence, in Mesopotamia, of cities with complex economies and political administrations required some form of accounting which could not be trusted to memory alone. Other forms of writing were then considered to have been derived through diffusion and transformation from this unique source. The archaeology of writing has tended to form a separate domain of archaeology, actually more closely associated with protohistory and historical linguistics, than with prehistory since writing is considered to be the precondition for the possibility of history and, as some would say, civilization itself.

However, early voices have suggested the possibility that there may not be such a radical gap between palaeolithic rock art and the emergence of writing. The French palaeontologist and prehistorian Edouard Piette (1826-1906) paid great attention to the numerous "geometric" signs engraved on bones and antlers along with figurative representations and coined the expression "glyptic writing" (1905) to describe such sequences in which he identified the formal, and possibly functional ancestors of early Cretan and Phoenician alphabets (1907).The British archaeologist William M. F. Petrie (1853-1942), contended in his inquiry on the origins of the

alphabet that, rather than considering the early systematic alphabet as an invention by some single tribe or individual in a developed civilization, “it appears that a wide body of signs had been gradually brought into use in primitive times for various purposes.” (1912: 2). Later, Max Raphael (1889-1952) developed the hypothesis that pottery decorations in prehistoric Egypt were actually forms of writing (1947). In a similar vein, Alexander Marshack (e.g., 1972) has attempted to demonstrate that various abstract signs observed on bones and stones can be construed as astronomical and calendar computations. More recently, a stronger claim has been put forward by Hans Bornefeld (1994), a provocative autodidact who goes beyond the evocation of mere possibilities and has boldly proposed a deciphering of palaeolithic rock art based upon some problematic linguistic reconstructions. But before examining in details such claims, a more general consideration of the arguments leading to such conclusions is in order.

2. When and why writing?

In the absence of Biblical pronouncements concerning the procurement of writing, this question has remained for long dependent on Plato’s discussions of the topic, at least in the western philosophical tradition. Thus, the Egyptian source prevailed until Mesopotamian scripts were shown to predate the pharaonic hieroglyphs and historical explanations were found to account for the spreading of this invention from the Middle East to North Eastern Africa. Two issues have consistently obscured the problem of the origin of writing: (i) the essential link that was assumed to hold between writing and civilization, hence the search for the location of the founding event and its subsequent impact on the ranking of ethnic identities; (ii) the assumption of the superiority of alphabetic writing over all other systems and the projection of the various script devices unto the axis of evolution understood as progressing from concrete and holistic to abstract and analytical. These two preconceptions are demonstratively inspired more by ideologies than by evidence. The former dubiously equates civilization with the birth of empires and the latter ignores the fact that the perfection of a script is not an absolute quality but is relative to the pragmatic requirements of the particular spoken language whose phonological system it is designed to represent. All scripts, including the alphabetic systems, have shortcomings and must devise supplementary signs, usually borrowed from the other systems, in order to meet their basic function.

Over the last fifty years, the "history" of writing has been rewritten several times and remains the object of controversies (e.g., Gelb 1963; Harris 1986, 2000; Senner 1989; Healey 1990; Coulmas 1996). It does now seem obvious that writing appeared in at least five different locations at times and in areas that make the possibility of a single source extremely unlikely. While the influence of Mesopotamian hieroglyphs on the scribes who developed Egyptian hieroglyphs appears credible, there is some evidence that this new system was not an absolute beginning but simply transformed, or was added to, an older local script.

Other results coming from advances in the archaeology of writing put into question two tenets of the earlier assumption: (i) the notion of sudden creation by an individual or small group; (ii) the essential link of writing with economic accounting and political administering. The former is inconsistent with a well-established pattern according to which technological evolution proceeds through small changes improving previous means of achieving some functions; the latter ignores the fact that religious concerns and their associated sideral computations are foregrounded in the most ancient cultures. Moreover, there is at least one universal in all known writing systems, including the alphabet: they all first derived the symbols they used to represent sounds from images of animals and other objects of their natural and technological environment.

Indeed, the narrative that purports to account for the artifactual emergence of writing follow the following argument: during the neolithic period, the development of agriculture in some fertile regions made possible a demographic increase and resulted in population concentrations in large settlements whose economic transactions and political administration generated numerous data which could not be trusted to human memory alone. Hence comes the hypothesis that the functional invention of graphic designs and reckoning systems through which classes of items could be unequivocally represented and symbolically manipulated for the purpose of recording. But the emergence of reckoning systems cannot be bounded to the necessity of economic transactions and predates the rise of the earliest empires. As it was pointed out in the previous section of this paper, a few prehistorians have contended that the numerous dots, notches and other "abstract" geometrical figures found on palaeolithic bones, stones and parietal surfaces were signs of computations. These sets of differential marks have been variously interpreted as hunting tallies, kinship records or calendar calculations. In view notably of the latter, it seems credible that reckoning was very early associated with religious concerns and behavior. It may be symptomatic that the clay artifacts described by Schmandt-Besserat

(1992) as the harbingers of writing were often found in temple complexes, and that the earliest evidence to date of deciphered writings are of a religious rather than economic nature.

The history of the various tools which define modern cultures show that technological evolution proceeds through small incremental steps (e.g., Basalla 1988). Evolutionary archaeology (Teltser 1995) provides interesting theoretical insights on the process by which tools and methods are selected by the environment. Scripts are kinds of tools whose appearance can only be conceived in an evolutionary framework. Like stone implements, they presuppose a symbolic capacity whose emergence with language can be traced back much earlier than has long been assumed. The plausibility of "concept-mediated marking" in the Lower Palaeolithic has been persuasively evoked (e.g., Bednarik 1995). Notational behavior has been demonstrated through analyses of the techniques used in the Upper Palaeolithic (e.g., D'Errico and Cacho 1994).

Early scripts from Mesopotamia, Egypt and China show that figurative and nonfigurative signs are consistently associated on bounded surfaces made of clay or other relatively durable material. Similarly, palaeolithic engravings and paintings very consistently associate these two kinds of graphisms on the bounded spaces of mobiliary objects and parietal surfaces with apparently proportional variations of scale. There is no plausible grounds for treating differently such associations as if they were separated by some unbridgeable time gap. Like in biological evolution, there cannot be any gap in technological evolution. Of course, in both cases, there can be parallel lineages some of which may happen to peter out while some others seem to surge unexpectedly. In general, the apparent sudden emergence of a phenotypical feature, both in biology and technology, can be accounted for by taphonomic logic or simply the haphazard way in which palaeontological and archaeological discoveries are made. Preconceptions also play an important role in the narrative construction of the archaeological record as a series of radical innovations (e.g., Gardin 1980).

In modern times, under the spell of the democratization of culture, language and writing are so much experienced as the two faces of a single phenomenon that illiteracy tends to be considered as an anomaly. At the same time, it has become somewhat difficult to think of a language independently of its script. However, the actual ratio between the two conveys a strikingly different picture. There are approximately 7,000 known languages whereas, to the best of our knowledge, fewer than 100 major scripts have appeared in the course of human history

(Lawler 2004). Languages and scripts seem to be on different time tracks that merge and diverge under a variety of cultural and socio-historical pressures. A case in point is provided by the system that is presently deemed the most ancient script: the Mesopotamian cuneiforms. This system apparently appeared between 5,000 and 6,000 years ago to graphically encode the Sumerian language but was also used for the Akkadian languages that succeeded Sumerian, although it continued to express the latter in the context of temple astrology until it was displaced by ancient Greek scripts. In theory, any writing system can encode any language with the possible reassignment of values or the addition of supplementary symbols in order to meet the particular requirements of the language to be scripted. Moreover, there are cases when a script seems to have been formally imitated for decorative or ritual purposes after its link with a language was lost through cultural extinction or social upheaval, as it happened for instance with the Mayan writing system (Lawler 2004: 32).

If the various repertories of palaeolithic "abstract" or "geometric" signs which have been made (e.g., Forbes and Crowder 1977, Leroi-Gourhan 1992: 125-161) are compared with those established by researchers investigating the earliest forms of writing (e.g., Fairservis 1992: 149-188, Schmandt-Besserat 1992: 143-150, Hunter 1993 [1934]: 131-190), a considerable overlap is observed. The resilience of these topological and geometrical types that are identifiable through a system of contrasting features such as being closed or open, whole or segmented, straight or bent, circular or angular and the like, does not suggest the permanence of any particular language or language family across time but definitely indicates both systematicity (since it is possible to establish finite lists of such types) and morphological continuity sustained by some kind of variable functionality (as it can be assumed that their copying was sustained by a symbolic drive of whatever sort it may be). The cognitive resources which account for the development of safe and economical ways of encoding important information were most likely available to early anatomically modern humans, including methods for encoding speech as the repository of collective or individual memory.

There is no lack of plausible motivations for such cultural behaviors to develop in geographical areas in which the climate is seasonal and often unpredictable, and in which the fauna undergoes fluctuations and migrations. Keeping track of relatively uncertain regularities in relation to other variable features of the environments such as animal behavior and sideral configurations, in particular the universally traumatic lunar and solar eclipses, is vital for a brain

which relies on flexible adaptations for survival, mainly if events that are perceived as erratic and ominous are ascribed to some invisible agencies. Any magic formula that has proved to be efficient in some cases is worthy of being preserved and protected at the same time. Another domain of plausible motivation for devising ways of inscribing speech on permanent support is the desirability of keeping track of ownership, ranks, genealogies of ancestors, and forms of intertribal compromises for the sharing of territories and resources once sociality extends beyond a core group of related individuals. In assessing the plausibility of such motivations we should keep in mind that encoding speech is more a way of protecting information than divulging it. Once again, let us not forget how recent in human history is the ideal of universal literacy. A culture that fosters scribes is not necessarily a culture in which writing is a general means of communication and where knowledge is democratized. This does not mean of course that cognitive resources are lacking. Ultimately, the range of circumstantial motivations that may be invoked to explain the emergence of writing is only constrained by the cognitive models we tentatively build to represent the mental abilities of anatomically modern humans. These models are sometimes so arbitrarily restrictive that what we now know about the intricacies of the life of social primates such as baboons (e.g., Kummer 1995, Sapolsky 2001) or bonobos (e.g., de Waal 2001) makes *Homo sapiens* seem somewhat intellectually retarded.

3. Epistemological leaps of faith and the scientific method.

The quest for knowledge is a perilous venture. The scrupulous acquisition and management of what is known in a given domain may lead to a sense of closure that precludes any chance of further discovery. By contrast, the urge to open new paths can result in unsubstantiated statements that prevent any meaningful interaction with the global scientific community whose ultimate consensus should be a researcher's goal. But pioneers have often no other choice but to take chances at the risk of being considered irresponsible or even insane. Such cases abound in the history of science. Visions, speculations, wild hypotheses may be forms of gambling but they are the dynamic that propels scientific knowledge ahead: there cannot be selection without variations. Scientific revolutions occur and new knowledge is eventually assimilated with due process by academic institutions. But academic settings tend to breed epistemological conservatism through the rituals of admission into particular disciplines

and their constraining paradigms as well as in view of the costly research infrastructures and hard wares that are required by most scientific investigations. In most realms of inquiry, being innovative first requires being conversant with the state of the art, and secondly being in a position to engage the current epistemological establishment. However, rock art studies stand somewhat apart because of the relative ease with which "amateurs" can enter the field. Any wanderer can come across a palaeolithic decorated cave by chance and claim, at least for a while, some form of intellectual ownership. Moreover, the nature of the knowledge upon which interpretations of rock art were based has been for long relatively easy to acquire and any serious autodidact could claim some form of expertise. In fact, early specializing in rock art research is a very recent phenomenon. Most pioneers in this field had been educated in other disciplines with the result that, to some extent, everyone was an "amateur" with more or less credentials. But whether one is a trained archaeologist, a physical anthropologist or an art historian, his / her interpretations of palaeolithic paintings and engravings will be biased by a particular disciplinary approach. This general situation is compounded when we consider the archaeology of scripts whose rare specialists are either comparative anthropologists or archaeologists and philologists (Lawler 2004).

In view of this situation, great attention should be paid to dissenting voices in the domain of rock art interpretations, and all hypotheses should be critically examined rather than dismissed or even mocked on principled grounds, that is, in the name of other hypotheses that have not yet been conclusively demonstrated to be correct. The current dominating paradigms tend to exclude, sometimes aggressively, that rock art, taken as a whole, could include early forms of script. The hypotheses proposed by pioneers such as Edouard Piette or Alexander Marshack did not prompt systematic inquiry that could have produced conclusive refutations. There might be several reasons for this. First, rock art specialists tend to focus on figurative parietal representations rather than mobiliary art. Secondly, they tend to foster a comprehensive view of "prehistoric" art on the model of an unilinear evolving phenomenon rather than as a set of diverse productions that could have been produced by numerous unrelated traditions and for a wide variety of purposes. Thirdly, they usually lack training both in comparative cultural anthropology and in comparative historical linguistics.

During the last decade, perhaps the most provocative hypothesis regarding palaeoscripts has been produced by the polymath Hans Bornefeld, a jurist, sailor and archaeologist autodidact

from Kiel, who claims to have deciphered the frescoes of Lascaux and other franco-iberic caves, and asserts that these representations are statements written in a language he calls "Cromagnonese". Bornefeld's combative rhetoric and idiosyncratic style can easily distract from the core of his arguments which can be summarized as follows: Let us assume that some palaeolithic populations were using a language comprising, among others phonic constructs, a set of mono- and disyllabic words by which they designated the various relevant objects found in their environment, and that they could produce statements by recursively combining these words according to simple grammatical rules somewhat similar to Chinese. Let us further assume that, under some particular circumstances, they were prompted to record important statements and used for this purpose graphic representations of animals or parts of an animal (when the word designating this animal was polysyllabic) in order to encode other spoken words that either did not correspond to a directly representable item or could not be iconically represented for reasons pertaining to beliefs or in order to protect secrecy. This presupposes a level of cognition that enables a basic awareness of the syllabic segmentation of speech and, moreover, acknowledges the difference between consonantal structures and vocalic variations. Let us now imagine a state of knowledge more advanced than the minimal one with which they are usually credited, which would include numeracy and, at least for some restricted groups, a first approximation of systematic astronomical observations.

From this hypothetical basis -- which may well be within the limits of plausibility for those who consider that proto-languages evolved some two million years ago and that symbolic thinking appeared with anatomically modern humans some one hundred thousand years ago -- Bornefeld makes two leaps of faith in order to specify, on the one hand, the sound patterns and grammar of "Cromagnonese", and, on the other hand, the socio-political context in which this language functioned. In both cases, he relies on the current literature concerning the attempted reconstruction of linguistic families (e.g., Figge 1995) and anthropological speculations about the socio-cultural profile of palaeolithic populations thought to be driven by a matriarchal system (e.g., Gimbutas 1989, 1991). The choices he makes will be considered either to be bold educated guesses or unsubstantiated flights of fancy, depending on where one stands theoretically on these respective matters. It is however important, in order to assess his scientific claims, to distinguish his hypothetical basis, as it is described in the former paragraph, from the linguistic characterizations and cultural contextualizations that are assumed in the second paragraph.

The presentation of some brief samples of Bornefeld's "decipherments" is now in order. Using information from the literature in comparative historical linguistics, it is postulated that bovines were designated by the word TO and horses by UMA. When a bison and a horse overlap the resulting figure is TUMA but since it is assumed that a consonantal structure can receive various vocalic values this configuration can generate the following words (1) TIMI, (2) TEMA, (3) TAMO, (4)TAMA, (5) TUMA to which Bornefeld assigns respectively the meanings of (1) *negation, not, unless*, (2) *to cut, to cut into pieces, to mutilate*, (3) *husband, fellow, consort*, (4) *total* and (5) *eclipse, darkness*. These vocalic assignments are not entirely arbitrary but are based on reconstructions compiled from the abundant literature of the proponents of linguistic macro-families. For example the word UMA is tentatively derived from the Ainu *uma*, Japanese *uma*, Chinese *ma*, Mongolian *mo-rin*, Kalmyck *mö-m*, Celtic *ma-rch*, High Old German *ma-ra*, English *ma-re* and can be related to a most ancient root meaning "to run" which is also found in the name of many rivers. In the same manner, the postulated word TO is motivated by the lexicon referring to the action of butting found in Sumerian *dhu* (to butt), Aramean *to-r* (bull), some African languages such as Ewe *to (*buffalo and to butt), as well as ancient European languages such as Latin *tau-rus* (bull), *tun-deo* (I butt), German *(s)tossen* (to butt). The same comparative process is applied by Bornefeld to establish a plausible meaning for the disyllabic words he postulates, suggesting at times that there were alternative spellings such as TUMA which could be written as a hand (TE) on a horse (UMA). Bornefeld's second step consists of identifying sequences of rebus like configurations and to creatively propose a translation in the form of a sentence, for instance a freeze of Lascaux that includes bovines, horses and harts in various overlapping positions and some geometric signs is phonetically rendered as TU TUMA OMO TIMI TEMA TUMU YAMA AYA with the hypothetical approximate meaning: *The sun will eclipse soon unless you sacrifice the prince consort to the goddess of the moon*.

The decipherments Bornefeld proposes are obviously unfalsifiable given the state of knowledge in historical linguistics and the lack of information on the beliefs and political behavior of prehistoric populations. This does not mean that they are scientifically useless because the lexicon and the grammatical rules he assumes provide a way to test the systematicity of the clusters of representations found in palaeolithic parietal and mobiliary art. Given a closed set of identifiable images, any sound values arbitrarily but consistently ascribed to each of them will allow to test whether or not they show some form of significant recursivity that could

qualify them as a script. In fact, Bornefeld's claim opens a unique way to scientifically engage the probing of the issue of palaeolithic scripts. It should be pointed out that his decipherments presupposes that the problem has been solved, which is a sound way of finding out whether this is the case or not, therefore to possibly exclude that palaeolithic rock art may be a script, or, rather, that its configurations do not fit the formal patterns of any known script that has been so far deciphered. This enterprise is definitely timely because it comes at a time when a rich intellectual environment provides relevant specialized knowledge. For instance, advances in various methods of linguistic reconstructions (e.g., Nichols 1992, 1998), elucidations of the phonological knowledge represented in ancient scripts (e.g., Miller 1994), and the possibility to develop appropriate software able to parse a large visual corpus, should offer the methodological tools needed for such a daunting enterprise and help decide whether Bornefeld's segmenting of the postulated "text" are *ad hoc* constructs or reveal some significant recursivity.

This is why Bornefeld's alleged deciphering of some "Cromagnonese" scripts should not be discarded without further examination in spite of its outlandish claim. His outsider status should not be held against him. It has been often pointed out (e.g., Robinson 2002) that one of the most important breakthroughs in script decoding, the deciphering of Linear B was achieved by an amateur. Michael Ventris (1922 -1956) was indeed an architect who had been fascinated by Minoan culture in his early school years and had kept an obsessive interest in the mystery of the Linear B code of the Mycenean Greek tablets (Chadwick 1958). Most important discoveries in this domain happened through creative and intuitive perception of previously unnoticed recursive patterns. Language can blind the eyes and constrain vision to a larger extend than is usually recognized. Narratives of hunting magic reveals countless arrows, clubs and spears on the walls of the painted caves, in the same way as stories of shamanistic rituals make entoptic shapes and hallucinated animal spirits appear instead on the very same walls. Geometric figures can be construed as sexual organs or as numerals whether they are perceived through the discourses of fertility rites or proto-astronomy respectively. This does not mean that anything can go because, ultimately, an exhaustive analysis of the formal properties of the archaeological record can yield decisive cues regarding what kind of systematicity, if any, can be demonstrated. It is always preferable to have as starting points explicit hypotheses that are falsifiable than vague interpretations that are based on biased selections of data supported by circumstantial evidence such as those provided by comparative ethnography. The argument developed by Bornefeld is

what was once characterized as the "strong" semiotic hypothesis (Bouissac 1993), whose only superiority over other interpretations is that it is the only one that is falsifiable on formal grounds.

4. Conclusion: A challenging research agenda

In view of the considerations that have been developed in the previous sections, it seems that there are now sufficient grounds for undertaking a systematic investigation of parietal and mobiliary rock art based on the heuristic assumption that these symbolic displays could be early forms of scripts in the proper sense of the term. This means that each type of symbols that would be identified would tentatively be considered to represent a sound or group of sounds of a hypothetical language. The set of types could be assumed to be finite as would be a set of phonemes (or morphemes) but the latter would be purely virtual objects since the corresponding language(s) would be assumed to be extinct. The data would then be parsed in order to test whether or not some form of recursivity would emerge, thus signaling a formal organization typical of languages.

This inquiry would first imply a drastic change of approach for the recording process itself by shifting attention from the physical and artistic qualities and features of the artifacts (such as morphology of the support, dimensions of the images, technologies of their implementation, and accuracy of the representations) to their formal recursive properties (such as the categories of symbols that can be abstracted from their concrete realizations, their mutual relations and their compositional ordering in the form of strings or clusters). At the same time, the main focus would be displaced from the monumental paintings resting in obscure caves to the mobiliary art that could be more easily crafted, handled and used or "read", and whose narrow surfaces, such as those provided by bones and antlers, constrain a quasi linear ordering of the symbols and can offer some clues regarding the systematicity (or randomness) of the choices made by those who engraved them.

If a mere principle of exhaustiveness of the record were to be followed literally, the end product would be an exact clone of the archaeological site, or at least a coding of all the actions necessary for replicating the displays as they stand now, that is, including all the accidents of the surfaces upon which the figurative and geometrical representations were drawn or engraved by

palaeolithic populations. This is certainly a commendable scientific endeavor, mainly in view of the progressive degradation of the archaeological sites under the impact of natural decay, vandalism, environmental pollution, and industrial development. However, this sort of indiscriminate recording pertains to the conservation through duplication of the raw data, and precludes the possibility of any direct interpretations until some particular properties of the raw data have been scientifically established, a process for which the formulation of a hypothesis or a set of hypotheses is the necessary precondition. The notion of absolute data is a positivistic myth. Data are indeed elaborated under the joint constraints of empirical evidence and theoretical guidance. For this, a principle of completeness rather than exhaustiveness should be followed and the grounds for selecting the various properties that constitute the data should be made explicit on the outset. All hypotheses introduce perceptual biases. Such filtering is unavoidable but all biases are not equally detrimental to a scientifically sustainable interpretation of the raw data. Data are theory dependent but not arbitrary. Some heuristic biases may open the way toward a better understanding of the archaeological record by uncovering regularities and, thus, making falsifiable predictions possible.

The sort of inquiry that is advocated here would require the synergy of truly pluridisciplinary teams, as none of the problems raised could be solved by the epistemological resources of a single discipline. The main drawback of many archaeological interpretations comes indeed from the fact that researchers who are otherwise fully qualified to investigate scientifically some aspects of the raw data they examine often tend to stray away from the boundaries of their specialized competence and venture speculations that are not based on accurate knowledge in the particular domains concerned by these interpretations. Let us hope that, some day, rock art will captivate the attention of broader teams of specialists than it is presently the case.

References

Anati, E. (1999) L'art des commencements. *Diogène* 185, 5-17

Arsuaga, J.L.(2001) *The Neanderthal's Necklace*. New York: Four Walls, Eight Windows.

Basalla, G. (1988) *The Evolution of Technology*. Cambridge: Cambridge University Press.

Bednarik, R. (1995) Concept-mediated marking in the Lower Palaeolithic. *Current Anthropology* 36, 605-634.

Bornefeld, H. (1994) *The Keys to the Caverns. The Ice-age Inscriptions, a partial decipherment of the enigmatic signs and animal pictures in Gaul and Iberia*. Kiel: Privately published

Bouissac, P. (1993) Beyond Style: Steps toward a Semiotic Hypothesis. In *Rock Art Studies: The Post-Stylistic Era or Where do we go from here*? M. Lorblanchet & P. Bahn, eds..Oxbow Monograph 35. Oxford: Oxbow Books

Chadwick, J. (1958) *The Decipherment of Linear B*. Cambridge: Cambridge University Press

Chauvet, J.M., E. Brunel Deschamps & C. Hillaire (1996) *Dawn of Art: The Chauvet Cave*. Translated by P.G. Bahn. New York: Abrams .

Clottes, J. & J. Courtin (1996) *The Cave Beneath the Sea: Paleolithic Images at Cosquer*. New York: Abrams.

Coulmas, F. (1996) *The Blackwell Encyclopedia of Writing Systems*. Oxford:Blackwell.

Demoule, J.-P. (1991) Les images sans les paroles. *Destins de l'image. Nouvelle Revue de Psychanalyse* 44, 37-56.

D'Errico, F. & C. Cacho (1994) Notation versus decoration inthe Upper Palaeolithic: a case-study from Tossal de la Roca, Alicante, Spain. *Journal of Archaeological Science* 21, 185-200

De Waal, F. (2001) *The Ape and the Sushi Master: Cultural Reflections of a Primatologist*, New York: Basic Books

Fairservis, W.A., (1992) *The Harappan Civilization and its Writing: A Model for the Decipherment of the Indus Script*. New Delhi: Oxford and IBH Publishing Co.

Figge, U., ed. (1995) *Language in the Würm Glaciation*. Bochum: Brockmeyer

Forbes, A. Jr & T.R.Crowder (1979) The Problem of Franco-cantabrian Abstract Signs: Agenda for a New Approach. *World Archaeology* 10 (3), 350-366.

Gardin, J.- C. (1980) *Archaeological Constructs: An Aspect of Theoretical Archaeology*. Cambridge: Cambridge University Press

Gardin, J.-C. & C. Peebles, eds. (1992) *Representations in Archaeology*. Bloomington: Indiana University Press.

Gelb, I.J. (1963) *A Study of Writing,* 2nd Edition. Chicago: University of Chicago Press.

Gimbutas, M. (1989) *The Language of the Goddess: Unearthing the Hidden Symbols of Western Civilization*. San Francisco: Harper & Row.

Gimbutas, M. (1991) *The Civilization of the Goddess: The World of Old Europe*. San Francisco: Harper.

Halverson, J. (1992a) Paleolithic Art and Cognition.*The Journal of Psychology*. 126 (3), 221-236

Halverson, J. (1992b) The First Pictures: Perceptual Foundations of Paleolithic Art. *Perception* 21, 389-404

Harris, R. (1986) *The Origin of Writing*. London: Duckworth.

Harris, R. (2000) *Rethinking Writing*. Bloomington: Indiana University Press

Healey, J.F. (1990) *The Early Alphabet*. Berkeley: University of California Press.

Humphrey, N. (2002) Commentary on Michael Winkelman, "Shamanism and cognitive evolution". *Cambridge Archaeological Journal*, 12, 91-93

Hunter, G. R., (1995) [1934] *The Script of Harappa and Mohenjodaro and its Connection with Other Scripts*. New Delhi: Munshiram Manoharlal

Kummer, H. (1995) *In Quest of the Sacred Baboon*. Princeton: Princeton University Press

Lawler, A. (2004) The Slow Death of Writing. *Science* 305, 30-33.

Leroi-Gourhan, A. (1982) *The Dawn of European Art*. NewYork: Cambridge University Press.

Leroi-Gourhan, A. (1992) *L'art pariétal: Language de la préhistoire*. Grenoble: Jerôme Millon.

Lewis-Williams, J.D. (2002) *A Cosmos in Stone*. Walnut Creek, CA: AltaMira Press.

Marshack, A. (1972) *The Roots of Civilization*. New York: McGraw-Hill

Miller, G. (1994) *Ancient Scripts and Phonological Knowledge*. Amsterdam: John Benjamins.

Petrie, W.M.F. (1921) *Corpus of Prehistoric Pottery and Paleetes*. London: British School of Archaeology in Egypt.

Piette, E. (1905) Les écritures de l'âge glyptique. *L'Anthropologie* 16 (2), 7-8

Raphael, M. (1945) *Prehistoric Cave Painting*. New York: Pantheon Books

Raphael, M. (1947) *Prehistoric Pottery and Civilization in Egypt*. New York: Pantheon Books

Robinson, A. (2002) *Lost Languages: The Enigma of the World's Undeciphered Scripts*. New York: McGraw-Hill

Sapolsky, R. M. (2001) *A Primate's Memoir*. New York: Simon & Schuster

Schmandt-Besserat, D. (1992) *Before Writing*. Vol. I, *From Counting to Cuneiform*. Austin: University of Texas Press.

Teltser, P. A. (1995) *Evolutionary Archeology: Methodological Issues*. Tucson: University of Arizona Press

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