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Lecture No. 7. **Towards a theory of cognitive origins**

Anthropocentric realities

Before addressing the difficult subject of early cognitive development it is requisite to relate two antithetical concepts of reality. One is of the "range of realities" as perceived by contemporary humans, with the perceptual and conceptual means available to them; the other concerns the idea or abstraction of an "objective reality" (Kant's *"Das Ding an Sich"),* which has been speculated to exist, and which would have existed and would go on existing independent of human constructs of it. In the present context it is essential to appreciate that the former of these concepts is not necessarily a reflection of the latter, and that our examination of cognition or its epistemology is severely limited by the tools available to us: we can only study this phenomenon with means (conceptual constructs) that are its own, subjectively conceived products. This may hardly seem a scientific basis (and it should be understood before we proceed), yet it is no worse than that of most other areas of "scientific" endeavor. Indeed, I have postulated that humans can study only one area of human consciousness objectively: that which is called art. It is the only phenomenon in human experience that can possess no "crucial common denominators of phenomenon category" that cannot be accessible to human perception (Bednarik 1994a). It was created specifically to relate to human forms of consciousness, in contrast to the rest of reality "out there".

All phenomena of the physical, "real" world are made up of large numbers of variables, of which humans can only detect those their sensory faculties and intellect allow them to perceive (Bednarik 1984: 29, 1985). From these they select what I have called CCDs (crucial common denominators of phenomenon categories), which are the basis of all cosmological taxonomies. Their selection is not determined by objective criteria in terms of how things really are in the world, but by the anthropocentrizing dynamics of human reality-building processes: by how phenomena can be interpreted and integrated into a system of understanding based entirely on human cognitive faculties. Since the latter were derived from human evolution, which was never in terms of defining cosmic reality, but in terms of such variables as survival value or procreational abilities, they must be assumed to provide only a narrow spectrum of objective reality. Consequently, scientific constructs of reality cannot be expected to adequately reflect real or objective reality. If we were able to view "science" objectively we might discover that its main significance is what it can tell us about ourselves (Bednarik 1985).

There are, however, exceptions. A phenomenon that is created by humans specifically for the purpose of relating to a human sensory faculty can only consist of CCDs determining its phenomenological externalizations or reifications that are readily accessible to human perception. Art is such a phenomenon: there can be no CCD in art that is entirely inaccessible to humans. Indeed, art is the only phenomenon in the real world that provides human access to all of its crucial variables. One can invert this postulate by defining art as the collective phenomena in human experience about which we can argue objectively. This truism explains how hominins attained their unique neural structures of relating to the world through paleoart—the core issue of this lecture series. The introduction of phenomena consisting only of humanly perceptible variables, such as the production of symbolic surface markings, rendered perceived "reality" conceptually manageable, by providing complete rather than fragmentary sets of percepts. Visual and mental taxonomizing processes and the inclusion of the new neural structures in cybernetic feedback systems became thus available for evolutionary selection. "Conscious experience", or rather what we understand by it, became possible because the neural facilities prompted by earliest paleoart production became available for the processing of stimuli of the non-artificial material world, in a taxonomizing format. This explains why the present results, humanly perceived "realities", are determined by paleoart, and are in the final analysis both valid and inadequate. The cultural cosmologies or epistemological models they derive from are ultimately false, or at least significantly deficient, but there is no reason why a biologically intelligent species (Jerison 1973) could not form and maintain indefinitely such invented reality constructs (Bednarik 1990, 1994a).

"Biological intelligence" does not necessarily lead to a better grasp of objective reality for the species concerned. On the contrary, its development follows evolutionary laws that render this unlikely, as they tend to lead an intelligent organism away from, rather than towards reality. While it is true that intelligent forms of life must participate in a process that inevitably leads to the evolution of more intelligent forms of life, the improvements will always be in terms of their ability to enhance access to energy and nutrient resources, and to promote procreational potential, never in terms of facilitating a better grasp of reality. Genotypes determine the sensory faculties of an organism and changes only occur within the confines of phenotypic plasticity. These abilities determine which material stimuli an organism can detect. Genes, as we have seen in the previous lecture, can also form neural circuitry that allows cross-referencing of sensory information, but the ability to construct conceptual models of reality, which defines "intelligence" biologically, is not itself genetically determined. Among highly advanced life forms, selection will favor organisms capable of the conceptual and

behavioral innovations from which new behavioral modes can be constructed: the mental faculties, not their constructs, are the selective determinant.

Some years ago I proposed that "the evolution of our sensory facilities and intellect can be assumed to have only equipped us with adequate faculties to make them useful; they were not selected on the basis of their suitability in defining the reality of the cosmos—in fact *there was no survival value in that ability*" (Bednarik 1984). I argued that because of the limitations of the genetically based sensory systems of organisms there could not be a direct correlation between humanly perceived reality and objective reality, and that this lack of relationship is the reason for the discrepancies between these realities. This, however, is not the only reason for the formulation of an anthropocentric world. There is at least one other, albeit more complex factor.

Human knowledge is derived from applying concept-building cognitive processes to external stimuli, i.e. sensory information, thus accumulating percepts. It is self-evident, I have suggested, that human knowledge has a tendency to reinforce itself through its own products, because it is continually validated and augmented by our material and cultural achievements (Bednarik 1985). But this interdependence becomes rather more sophisticated and complete when we involve the role of culture. In the sense used here, the term "culture" does not refer specifically to human culture, but to the biological concept of culture: the individually acquired system of "understanding" which reflects the distinctive life trajectory of the organism in question (Handwerker 1989). In this sense, cultural dynamics refer to the processes by which the intelligent organism alters its perceptible environment through its dialectic participation in the processes shaping it. Selection in favor of increased levels of "intelligence" is the inevitable outcome of such interaction among percepts, concepts and behavior patterns, but at no stage of this autonomous process is there any need for the concepts to be in tune with objective reality. Provided that the internally consistent logical framework is not challenged by it, there is no reason to assume that an entirely false, cultural cosmology or epistemological model could not be formed and maintained indefinitely by an intelligent species. Once again it is obvious that evolutionary success is irrelevant to the objective merits or validity of such models.

One can conjecture about the possible shortcomings of a cosmological construct, for instance by comparing them to those of "scientific" constructs that are based on confirmation (Tangri 1989). Indeed, the comparison appears valid—and quite illuminating. Just as the basic error in confirmation or induction is the inability of the inevitably subjective observer to identify the one variable of the phenomenon category that determines the common characteristics we perceive as crucial (my CCD), the deficiencies of conceptual models of reality cannot possibly be explored from within such a model, which is the only way in which we have been able to proceed so far, as a species. In an anthropocentric system of reality, ideas or mental constructs must adhere to its inherent order not only to be acceptable, but even to be liable to be conceived—even though they comprise elements relating to material stimuli, i.e. elements that must be assumed to have some form of objective validity. This is because they can only be generated by involving memory traces based on the same system, and one could argue that the inherent order might simply be a reflection of neural hierarchies (in rather the same way as the early paleoart universals discussed in the previous lecture). Therefore we cannot even speculate whether there is any such order in objective reality "out there".

About science and reality

To summarize what has been said so far: the concepts of reality that have evolved in the course of hominin and human history have led to the one apparently held by all extant human populations (but even this point is debatable). There is no reason to assume that these concepts could be particularly useful in exploring objective reality. What we can state categorically is that anthropocentrism governs all human consciousness, and that this knowledge has been with us for over two millennia at least: it is quite clear from Plato's simile of the cave that he, for instance, understood the concept of anthropocentrism. Developments in the twentieth century, in philosophy and theoretical physics, have begun to erode beliefs in the common-sense world epitomized by Newton and Euclid. The transient, ever-evolving nature of anthropocentrism has become more apparent since we have realized how many of even the supposedly most solid tenets have fallen by the wayside. As we approached the third millennium we realized at last the scientific enlightenment humans thought was within their grasp turned out to be a mirage, while the horizons of knowledge seem to be forever retreating from us. Science itself continues to occupy a position that is for the most part within the human model of reality. It is therefore fundamentally subjective; many of its rules may be valid only within its own frame of reference. This is of course quite adequate in terms of the demands we make of it, as long as science is not expected to lead us to objective reality.

Progress towards more realistic knowledge will probably not be in the form of sudden, major break-throughs, but will occur in the course of continuing intellectual and cognitive evolution. Mental constructs or ideas are ephemeral elements, being continually re-formed, modified and re-cast in the creative learning processes of individuals. It may not be realistic to expect a significant change in human cosmology over the next few centuries, even though over the last century we have gained an unprecedented understanding of the influence of certain factors on the phylogenetic processes of cognitive evolution, on how the continual reshaping of world view and heuristic history has prompted an acceleration in the production of new conceptual

and behavioral innovations, and on the roles played by identifiable elements in generating cultural dynamics. Yet even this significant broadening of the perceptual base will not by itself suffice to elicit more than a gradual development towards better understanding, as it will still be within the parameters of anthropocentrism.

One potential course is to attempt to explore the early development of human consciousness, focusing on the period during which the cognitive niche might have been established. If valid information about the underlying processes could be secured, this might lead to the formulation of hypotheses about the origins of our anthropocentrism. While this would of course not by itself provide any access to objective reality, it might permit realistic inferences about the articulation between anthropocentric and objective reality. That some form of such an articulation does exist seems likely, it is difficult to see how there could be none at all. If one could explain the mental and cognitive processes involved, one might not only find it possible to consider the neural developments required and the biochemistry to account for them, but one might also find it possible to tackle the ultimate challenge: to explore reality outside that which is perceptually and conceptually accessible to humans.

While it is likely to take us hundreds if not thousands of years to achieve this, I feel that the formula as such might be quite simple. If one could explain how the cognitive basis of our world view was acquired—by quantifying, or at least defining, the processes involved—one ought to be able to speculate about the selective forces involved, how they contributed to the outcome, and how others would have altered the same. Such random forays into extra-human reality would lead to a fading of the boundaries separating it from anthropocentric reality.

The question of how much do we know about the cognitive development of hominins, the key subject of this series of lectures, is obviously the starting point of any inquiry into these profound matters. How much do we actually know about the intellectual evolution of early humans, how reliable is it, what is it based on, and what are the reasons for the gaps in our knowledge? Clearly, these are questions of epistemology.

Archaeology and reality

Archaeological studies, especially of the second half of this century and in the Western countries, have concentrated almost entirely on what are believed to be valid interpretations of the ecological responses of humans, on how they may have adapted to changing environments, how they may have extracted their subsistence, how they are thought to have survived in their physical environment. Their intellectual environment has been almost completely ignored in the heuristic dynamics of this discipline. Herein lies one of the reasons why archaeology finds itself in its present cul-de-sac, although not the most important one: the inaccessibility of its interpretive models to scientifically valid methods of testing (Tangri 1989). It has in effect tried to define “pre-history” in terms of an ecological deconstruction of culture, yet the development of humanity is based on cultural and cognitive factors, not on genetically determined abilities to improve access to resources. Ecological negation of this self-evident truth has led to many unrealistic and unscientific constructs. In the specific area of intellectual evolution, ecological archaeology has provided us with only fragmentary, unreliable and sometimes downright irrelevant evidence. Much of the discussion has centered on the human capacity to possess advanced language (itself an anthropocentric notion), and the present situation shows to what a vast range of incompatible ideas an inappropriate research program can lead. To illustrate with an example: in respect of the Neanderthals we have the extreme views that on the one hand they were totally incapable of reflective language (e.g. Davidson and Noble 1989; Noble and Davidson 1996), and on the other that they were capable of well-structured grammar and syntax (Falk 1987), and there are various intermediate views (e.g. Lieberman 1984). So in practical terms Neanderthal’s linguistic ability must lie somewhere between that of an animal and a modern human! One does not need archaeologists or anthropologists to arrive at such a view. Similarly, the beginnings of complex language could be anywhere between 35 000 years and some millions of years ago, according to the various competing theories. This illustrates the impotence of archaeology in explaining much, a point already made in Lecture 5.

The types of evidence brought to the task of solving the problem include the cortical development inferred from cranial casts (Falk 1983), and the still continuing, unproductive speculation concerning the fossil laryngeal structure and the role of the hyoid bone (Marshall 1989), all of which is tenuous and far from unequivocal. But cortical or speech-related structures surely are results, not causes, of evolutionary selection favoring speech or intelligence: a selection criterion needs to be established before it can affect phenotypic selection of genes. The reasons for the type of cortical developments we are interested in are not to be found in secondary symptoms, and by utilizing these in their hypotheses archaeologists have merely substituted symptoms for causes. What we need to ask is what could have been the true causes and dynamics in the cognitive developments that provided the new traits for selection, and which ones could have left detectable traces for us to discover? How would one find and identify such traces in the archaeological record?

As we have seen in the course of these lectures, there is ample archaeological evidence available to address these issues. However, instead of drawing from this rich source, Pleistocene archaeology has focused largely on creating a history of tool types it had itself invented. Tools, obviously, do not define cultures, they are cross-cultural artifacts. Nor do they define ethnic groups, social groups, tribes, nations or civilizations. Moreover, the

tools or other artifacts archaeology names are always etic or arbitrary constructs of "material evidence categories"; they do not define emic and valid taxonomic entities. Therefore even if diagnostic tools could recognize cultural traditions, it would still have to be doubtful that archaeology could have identified these reliably.

Culture is scientifically defined as the passing on of practice by non-genetic means (i.e. by learning), and is therefore practiced not only by humans, but also by many other animals, especially primates. Archaeologists sometimes use the term "cultural layer" to simply describe a sediment layer that contains charcoal, even if it contains no artifacts. There may be no proof that the charcoal in question is anthropogenic, in which case the term is fundamentally misleading. However, even in the presence of such artifacts as stone implements or pottery shards, the term "culture" is not appropriate. In the case of humans, "culture" defines the collective customs, beliefs and arts of a group of people who are usually bound together by it, and these are passed on from generation to generation. It does not refer to tool types; we have no spear culture, knife culture and so forth. Tool types, obviously, exist cross-culturally, and to claim that certain specific archaeological tool types do define specific cultural entities is a case of circular argument. It is also an unfalsifiable proposition, hence not scientific, as indeed are all propositions of archaeology not based on data imported from the hard sciences. For instance, all archaeologically perceived tool types of the Pleistocene are untestable constructs. Similarly, the "cultural sequences" archaeology has provided for the Pleistocene may exist only in the minds and the writings of Pleistocene archaeologists, they may not have any external or emic existence. Certainly, they are not testable, which is not to say that they are inherently false, only that they are not scientific.

It is self-evident that hominins did not become human through the natural processes that modified their skeletal architecture, but through processes that enabled them to develop culture, cognition and technology on a scale removing humans far from all other primates in those areas. However, archaeologists and paleoanthropologists have provided us with a history of the human ascent that focuses very much on the physical evolution of hominins. By comparison, almost no effort has been directed towards learning about their cognitive and cultural evolution. It is therefore quite right to say that the reasons for humanization and the processes involved have so far barely been considered, and most certainly they have not been clarified. Indeed, the preoccupations of the discipline have led to research orientations that are so skewed that it would be unrealistic to expect these disciplines to be able to address the topic of hominin evolution in anything resembling a balanced fashion. In these circumstances, particularly when they are viewed from the perspective of taphonomic logic (Bednarik 1994b, and see below), it seems judicious to regard archaeological narratives of the earliest human past as probably being largely false.

In all fields, not only in archaeology, the dominant and the hegemonic can be both sustained and subverted by narratives (Ewick and Silbey 1995: 200). Narratives frame the world in a struggle for authority; they create ontologies. In the case of the Lower and Middle Paleolithic periods of human history, the dominant narratives of archaeology are more tenuous, more far-fetched and more invalid than for any other period of our existence as a genus. Over the past few decades, the dogma developed for these periods has become a caricature of archaeological interpretation. In its essence, this dogma perceives no cultural change or evolution throughout most of the Lower Paleolithic, roughly from 1.8 million years ago to 180,000 years ago. It defines this time as static, and sees little change even in the subsequent Middle Paleolithic, which ends 40,000 BP in much of Eurasia, 20,000 BP in Africa and only a few thousand years ago in Australia. Then, with the advent of the Upper Paleolithic, around 40,000 years ago, the dogma perceives a cataclysmic "bottleneck", a "quantum jump", an "explosion": all the typically human characteristics that distinguish us from other animals appeared suddenly and at once—and, of course, in western Europe: art, language, complex social systems, self-awareness, forward planning and symboling. This paradigm draws its inspiration from the "African Eve" model, according to which all living humans are the descendants of one single female. Her progeny lived somewhere in sub-Saharan Africa in the late Middle Pleistocene, and for unknown reasons became genetically so different that they could no longer breed with other humans. Once they had asserted their intellectual and other superiorities over the neighboring peoples they began to expand, rapidly taking over the world as they eradicated or displaced all resident populations in Africa, Europe and Asia. Upon reaching Southeast Asia around 60,000 years ago they promptly started building seaworthy watercraft to continue on to Australia. By 35,000 years ago they colonized western Europe, where they wiped out the resident Neanderthals completely and suddenly began painting in caves.

This is not, I emphasize, the absurd origins myth of some Californian religious cult. This is what most Anglo-American Pleistocene archaeologists believe actually happened, together with a good number of their colleagues elsewhere who agree with them. And this caricature is what is being taught in the universities of Britain, USA and Australia, among other countries. This model has not one iota of archaeological evidence in its favor; it is based simply on the speculations of some geneticists, opposed by other geneticists. Bearing in mind that the genetic divergence times based on unknown mutation rates and population sizes are dubious (Barinaga 1992; Templeton 1993, 1996; Ayala 1996; Brookfield 1997; Pennisi 1999; Strauss 1999), to say the least, it would appear that the formulation of the African Eve model was a simple misunderstanding. The geneticists tailored their supposed mutation rates and other unknown variables to suit such emergence times for

modern people they had been given to understand were reasonable, while the archaeologists assumed that the geneticists themselves had the correct numbers. Neither side effectively realized that the other was only guessing. In reality, population sizes as well as mutation rates and other crucial variables are entirely unknown, and the divergence times given have no credible independent basis at all. Moreover, the model was based on numerous errors of fact and fake datings we have already visited in Lecture 2.

The long-range model perceives a gradual evolution of language, art-like productions, advanced hunting methods, shelter building, garment making, social complexity, and of course the symbol use which drove most of these developments. This gradual evolution occurred over vast time spans well before 35,000 years ago, and some of it was already underway around a million years ago. The evidence for the long-range model consists of panoply of material finds which, sadly, the short-range protagonists are uniformly unfamiliar with (Bednarik 1992, 2003a). When confronted by individual finds that challenge their model they try to explain them away, or regard them as a "running ahead of time" (Vishnyatsky 1994), or pronounce them as untypical, or challenge their dating or the scholarly competence of their promoters. This is a familiar pattern in Pleistocene archaeology, dating back to the times of Boucher de Perthes and Pengelly, the "incompetent amateurs" who discovered the Paleolithic in the early 1800s, as well as to the later, similarly "incompetent" discoverers of fossil man (Fuhlrott), Pleistocene art (de Sautuola) and *Homo erectus* (Dubois), and many more scholars since, all of whom were persistently rubbished, ridiculed and persecuted by orthodox archaeology. This alone should be sufficient reason to distrust establishment archaeology, the system of a discipline whose practitioners are trained, licensed and employed entirely by the state. There is thus nothing new in the present confrontation, it is an ancient issue of an inadequately informed discipline that tries to rely on its lack of falsifiability to resist change. When it perceives itself under attack, as it does rather often (from renegade archaeologists, amateurs, indigenous people, science commentators), it closes ranks and reverts to dogma. It behaves like a belief system, like a religion (Freeman 1994).

Towards an informed archaeology

In examining the very beginnings of symboling we therefore have had to make an initial choice: to follow either the long-range or the short-range model. With the latter, the answer is relatively simple: according to it there is no use of symbolism before the advent of the Upper Paleolithic, where its origin is said to be fairly transparent. According to I. Davidson and W. Noble (1989 et passim), the answer lies in the introduction of figurative or iconographic imagery. The transference of the meaning of a word was only possible after a picture of the object had been drawn. In a nutshell, the process was like this: one drew a bison, pointed to it and said "bison", and that is how language began. Clearly, then, depiction had to come before language, and symboling began with it.

Here, we have followed a rather more sophisticated paradigm, and one that is backed by substantial evidence, archaeological, cognitive and neurophysiological. We have seen that the finer details of the origins of human cognition remain to be resolved, but we have also seen that the general parameters of the process are accessible, and that the timeframe within which it occurred extends over a few million years, rather than just 40,000 years. Pleistocene archaeology has, once again, failed, and has once again been corrected by proper science.

Concerning the resilient myth attributing the most significant cultural achievements to Europe it must be noted that technologies long established elsewhere took a long time to reach western Europe. Barbed bone harpoons, for instance, were made in Africa and east Asia many tens of thousands of years before they made their debut in Europe, during the Magdalenian. The earliest decorated pottery of Japan is twice as old as that of Europe, and the earliest ground stone axes of Sahul (Greater Australia) are six times as old as their first European counterparts. The Paleolithic art of Eurasia east of the Rhine seems to have been almost entirely free of graphic figurative depiction, consisting instead of much more complex designs. If one excludes the few examples that are more appropriately considered as bas reliefs (such as the anthropomorphs from Molodova V, Ukraine, and Kostenki I, Russia; Abramova 1962) or that are doubtful (such as the rabbit-like engraving from the latter site, or the iconic elements Marshack [1989] discerns in the markings on the mammoth tusk tip from Kirillovskaya, Ukraine, which I have examined and regard as non-iconic), the confirmed iconic figures in the "Paleolithic" graphic art of eastern Europe and Asia are limited to the undated paintings in Kapova Cave (Boriskovski 1984: 226) and Ignatiev Cave (but note that Steelman et al. 2002 have dated a "Paleolithic" "mammoth" figure in that cave to 7370 ± 50 BP) and two "mammoth" engravings, one each from Mal'ta and Bereliokh, Siberia, and perhaps one figure from Hayonim Cave. Instead of iconic (to the European eye figurative) elements, graphic Paleolithic art seems to have consisted almost entirely of "geometric" arrangements. In about 97% of the total area of Eurasia, graphic Paleolithic art, where it does occur, seems almost entirely restricted to geometric or non-iconic marks. Of particular interest are the numerous "geometric signs" on portable objects from Russia (Marshack 1979), Ukraine, Siberia and India (Bednarik 1994b). They are best exemplified at Eliseevichi, Mezin, Kirillovskaya and Mezherich (but also occur, less pronounced or in smaller numbers, at Patne, Mal'ta, Afontova, Kavkaz, Balinkosh, Klinets, Timonovka, Suponevo, Novgorod-Severskaya, Avdeevo and Gagarino), in the first Paleolithic art discovered in China, and in several engraved

objects from the Levant (especially the Urkan e-Rub II plaque and an Upper Besor 6 ostrich eggshell fragment). The same pattern is found in southern Africa (Blombos Cave) and may later have extended to North America, where it occurs in the Clovis tradition. Preliminary indications are that these traditions begin in the Lower Paleolithic and continue right through to the end of the Pleistocene.

Seen in a greater perspective, some distinctive stylistic traits can be discerned in these works, and I have proposed that the traditions characterized by them are culturally more complex than those of prominent, more or less "naturalistic" (in the sense of Western-conditioned perception) animal profile figures, such as those of the classical Franco-Cantabrian traditions. The simplistic view that such animal figures are cognitively more sophisticated than the often highly complex "geometric patterns" of these eastern sites is easily refuted. If we separate art works into three-dimensional figurative, two-dimensional figurative and non-figurative genres, we see that the first is the least complex and the last the most complex. This is because in the first art genre, referent (the object depicted, the signified) and referrer (the art motif) are cognitively relatable by direct visual resemblance of certain physical characteristics. In graphic figurative art, the referent is related to the art motif through the projection of certain of its characteristics onto a two-dimensional plane, so the perception of its relationship to the referrer involves a decoding process requiring certain cognitive faculties. In entirely non-figurative arts as well as those that use highly "stylized" versions of iconicity it is impossible to know the referrer, unless one has direct access to the cultural conventions in question. Moreover, in the last-named art form, concepts or ideas involving no figuratively definable referents can readily be "depicted". It is therefore clearly the most sophisticated art genre, and can communicate unlimited numbers of ideas, in rather the same way as written characters.

This separation can be correlated broadly with the main stages of human evolution. The Makapansgat cobble would seem to indicate an early hominin ability to detect at least some aspects of iconicity, even if only at a "reflexive" level (Bednarik 1998). It would then be reasonable to consider that subsequent hominins developed the capacity to detect iconic properties of natural objects (such as the Tan-Tan and Berekhat Ram pebbles). A predilection for abstracting three-dimensional likeness to graphic image apparently developed more recently, perhaps preceded by an ability to replicate two-dimensional imagery, such as phosphenes (Bednarik 1987), fossil imprints (Feliks 1998) and, in some traditions, eventually tracks. The use of non-iconic markings to form complex patterns of communicable meaning seems to originate in Middle Paleolithic traditions of Africa or Asia, on present evidence. This last art form, the most sophisticated, dominates in most of Upper Paleolithic Eurasia. Even in the western European cave art, "non-figurative" motifs far outnumber zoomorphs, and since they are almost certainly symbols of specific meanings, they are more semiotically complex than the usually favored animal figures. An animal picture, by itself, communicates very little by comparison, but it has been much more likely to attract scholarly attention.

This is in itself an intriguing point: considering that the communicative value of a so-called Paleolithic "sign" is most likely more sophisticated and informative than that of an animal outline, why are scholars, who are surely meant to see beyond these "aesthetic" superficialities, so preoccupied with the figurative component of this art? I do not seek to detract from the great artistic excellence of the Upper Paleolithic animal figures, I am as much in awe of these masterworks as anyone else. But the scholar is meant to be objective enough to see that the semiotic potential of these pictures is rather limited. The rules of refutation force me to accept that I cannot, definitively, determine the species of the animal apparently depicted, because my opinion cannot be falsified. It only reflects my own cognitive and perceptive processes. The falsification of a proposition is not a democratic process, subject to a majority decision, and even what all the experts of Paleolithic art collectively think was depicted in a picture does, in the final analysis, not amount to evidence (cf. Macintosh 1977 for a conclusive demonstration that alien researchers cannot identify zoomorphic motifs in rock art).

At first sight it would appear that the outstanding oddity of Pleistocene art is the rich Upper Paleolithic figurative art corpus of south-western Europe, with its strong development of iconic graphic depiction, but there is in fact a more perplexing deviation from a simple evolutionary trend evident. Simple non-iconic markings appear in the late part of the Lower Paleolithic, and they continue to be made during the Middle Paleolithic. Over an enormous time span they seem to experience some change towards increasing complexity, but their range nevertheless remains remarkably consistent: parallel lines, convergent lines, radial motifs, zigzags or meanders, dot patterns, lattices, circles. Their wide distribution over the Old World suggests a near-global cognitive tradition that perhaps coincides with archaic *Homo sapiens* groups, and may even have been universal to them. This art form continues throughout the Middle Paleolithic and is eventually taken to Australia by Middle Paleolithic sailors, where it manages to survive into the Holocene. The only cohesive explanation so far proposed for this long-lived and near-global "tradition", which culminates in a distinctive set of motif types, is the phosphene theory (Bednarik 1984, 1987, 1990; Hodgson 2000). This is also the only scientific theory so far proposed for art origins, in the sense that it is a fully falsifiable and thus testable proposition.

Irrespective of this interpretation of the existing record, it appears that by Upper Paleolithic times, traditions of using non-iconic markings had become so sophisticated that they appear to have served for mnemonic, record-keeping or other exceedingly complex semiotic activities, e.g. in Russia and Siberia. Their vestiges have

so far attracted only cursory attention and these traditions remain profoundly unknown. At the same time, similarly complex traditions of "geometric decoration" had evolved across Asia, for which only impoverished parallels can be discerned in south-western Europe. On the other hand, the very few iconic graphic depictions of Eurasia east of the Rhine, while indicating that this art form was available across the continent, seem to suggest that it was not widely used. But before we draw this conclusion we would be well advised to consider alternative interpretations. For instance, the apparently complete restriction of Upper Paleolithic rock art in Europe to limestone caves is almost certainly a taphonomic phenomenon, and as such must not be used to formulate explanations without the extensive use of taphonomic logic (Bednarik 1994c, 1995a, 1995b). Similarly, even if these severe limitations imposed by taphonomic logic did not apply, distribution of evidence would still be a function of research effort, which has massively favored Europe, especially south-western Europe, for over a century. In Asia, for example, only two small regions have seen some level of concerted effort in this area, the Levant and the Irkutsk region. Both have yielded good evidence, but many parts of Asia have never been subjected to any serious attempt to locate Pleistocene art. In other words, frequency of evidence seems to be directly related to intensity of research work, qualified to a considerable extent by research biases introduced from Europe. In many cases such endeavors were guided by European ideals of "what to look for". Bearing in mind the exceptional nature of those "ideals", this was clearly a misguided approach that can only have led to biases in data gathering practices. For instance, the Pleistocene bone harpoon of Lohanda Nala in India was interpreted as a female figurine until I examined it, and many Chinese, even North American, investigators have been guided in their search for early art by the European paradigm. This was a direct result of the false models of Pleistocene art evolution emanating from south-western Europe.

The global development of Pleistocene paleoart is very different from what has been perceived to have occurred in south-western Europe. But it will take a long time to eradicate this mythology, not just because it is so entrenched in the published record as well as in the public's mind, but because there exists an influential academic structure that will resist the corrections necessary to create a reliable basis for the cognitive evolution of humans. In a model of global origins of symbolism as demanded by the evidence I have listed, and by other factors related to this topic, the rock art and mobiliary art of south-western Europe are of peripheral significance, instead of occupying center stage as the orthodox model would have it. Throughout the Pleistocene, Europe, a small and unimportant appendage of Asia, played a marginal role in the evolution of hominin cognition, and south-western Europe in particular was a cultural and technological backwater of the world, a geographical cul-de-sac remote from the main theatres of this evolution in eastern Europe, the Near East, southern Asia and parts of Africa. It is therefore not to be expected that the figurative art of the Franco-Cantabrian sites, which is no more than a taphonomic fluke, had a decisive influence on the major cultural currents that developed during the Pleistocene and especially towards its end. What I have tried to show here is that these major currents have been so inadequately studied to date that they remain largely misunderstood. Not only are the data hopelessly skewed by the false model of art origins, they are just as distorted by other factors, especially geographically uneven research efforts and the pronounced biases of researchers and research directions.

Towards a theory of cognitive origins

However, the most fundamental aspect of the topic of this lecture and the strongest evidence that traditional archaeology can provide only unsatisfactory models of "art origins" still has to be discussed. The material evidence listed in this paper is actually redundant in showing that this traditional model must be false. Taphonomic logic is an axiom-like principle capable of filtering out false and whimsical hypotheses in archaeology. It views archaeological populations of evidence categories as the surviving remnant of cumulative populations that have been subjected to continuous and perfectly systematic degradation selecting in favor of specific properties facilitating longevity. The greater the age of the evidence, the more distorted its distributional and compositional variables, until a point in time is reached at which all these variables become literally irrelevant to the interpretation of the aspect the phenomenon category in question is supposed to refer to. Or in other words: the further we go back in time, the more misleading traditional archaeological interpretations must be expected to be. For most archaeological evidence categories, the composition and distribution of the material evidence of the Pleistocene has little or no bearing on explaining the societies, cultures or even technologies in question. The reason for this is very simple: if taphonomic processes effect the loss of a certain portion of a phenomenon category per time unit, a point in time must be reached when all of the evidence above a certain age (the "taphonomic threshold") should be exhausted. In reality this cannot occur, because the probability of survival of any evidence can never be nil. Therefore there will be a tiny remnant population, consisting of "survival flukes" (e.g. rock paintings in deep caves), extending beyond the threshold time of the phenomenon category. Archaeology systematically misinterprets these specimens from a category's "taphonomic lag period" (for explanations of this quantifiable form of logic, see e.g. Bednarik 1994c, 1995b: 630, 2001) by regarding quantifiable variables as being culturally significant, when in fact they are largely or entirely attributable to taphonomy. For instance, the world distribution of hominin remains is not a map of hominin distribution, it is a map of the distribution of sedimentary and other preservation conditions favoring

the survival of such remains, combined with the distribution of both hominins and research efforts to find their remains.

Taphonomic logic is capable of predicting accurately the type of evidence of paleoart one should encounter so further one goes back in time. Such evidence should become progressively less common, until a point in time when it seems almost to disappear from the record. However, beyond that threshold it should still extend for a much longer period in the form of extremely rare specimens. With increasing age, specific art forms should occur in specific environments—such as figurines of calcite, bone and ivory in limestone caves and loess deposits, or rock paintings in deep caves. As one proceeds back further in time, one should encounter very rare specimens of particularly deterioration-resistant forms: deeply cut petroglyphs such as cupules on highly resistant rock types such as quartzite, stone figurines, hematite crayons and the like, i.e. the types of materials that were at the disposal of hominins and had the greatest prospects of surviving under fluke conditions.

It comes as no surprise that the kinds of quantitative and qualitative evidence taphonomic logic predicts is precisely the kind we are finding. The oldest single specimen of paleoart in the world is a round cobble of jasperite. This is about as deterioration resistant as we can hope to find from that time. There are no surprises here. If we were to perpetuate the penchant of traditional archaeology to misinterpret the evidence, we could create from the available catalogue of finds a model of how art-like production began, with stone figurines and quartz crystals and cupules. This is how archaeology translates data into models, *and it is the fundamentally false way*. It merely demonstrates that Pleistocene archaeology must be expected to be wrong most of the time. The taphonomic interpretation of the above catalogue is the precise opposite: the evidence of figurines and crystals and cupules demonstrates that paleoart *did not* begin with figurines and crystals and cupules. Until archaeologists appreciate why this is so and then apply this logic to all their finds, their discipline can only remain a "consensus fiction" of the past (Bahn 1990: 75).

What follows from this is that if we wish to probe the origins of human cognition and symboling, we need to find sophisticated ways of processing the tainted evidence of traditional archaeology. Provided that we appreciate the severe shortcomings of a record distorted by selective acquisition and academic biases of various types, there is ample archaeological information at our disposal. As long as we realize that this information was often gathered to underpin relatively simplistic notions about the human past, and acknowledge the taphonomically determined limitations of data on distribution and composition, there is much to be gained from the available record. This is therefore primarily a task of reviewing the accumulated "archaeological record", testing it by scientific refutation, discarding the worthless components, and extracting the sound information that is relevant to tackling the questions of our cognitive origins. Only after this step has been accomplished can we expect to be adequately equipped to undertake forays into the most demanding academic challenge of all: to explore the origins of our intellect and our constructs of reality. In doing so I predict that we will find the answer lies in the nexus between semiotics and cognitive science. Without symbolism, that system of external storage of human knowledge, our constructs of reality, and thus their position relative to "objective reality" (should such an entity have an existence), will forever remain inaccessible to us. And we, as a species, will fail to understand ourselves effectively.

So far in human history we have failed in this task. It is my contention that this is not due to some inherent intractability, but due to the skewed database we have used, due to skewed interpretations of this distorted database, and due to skewed research orientations. If we can overcome these impediments, the most profound scientific questions we are capable of asking can be pursued profitably. In this quest, informed semiotic study of the earliest forms of human symbolic expression must form a core element. The prerequisites of such a pursuit, the first major improvement since Plato posed the issue of anthropocentrism, have been presented here.

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