Robert G. Bednarik

(robertbednarik@hotmail.com)

Beads and the origins of symbolism

Introduction

An archaeological issue that has been hotly debated in recent years, and that is of considerable relevance to semiotics, is the question of the origins of symbolism. There is no consensus in contemporary archaeology of how, where and, especially, when symbolism began. Broadly speaking, two schools of thought have emerged, which are best described as a short-range and a long-range model. Few if any researchers occupy the middle ground between them. According to the currently dominant short-range model, the earliest evidence we possess of human symbolism is in the forms of art and indications of language ability. No art-like productions are recognized of an age exceeding 32,000 or 35,000 years, and the earliest available language evidence is seen to be the first successful colonization of Australia, thought to have occurred perhaps 60,000 years ago. This school of thought is probably most coherently articulated in the work of two Australians, Davidson and Noble (1989, 1990, 1992; Noble and Davidson 1996; Davidson 1997). It categorically denies the possibility of human symboling abilities beyond, say, 100 ka (100,000 years) ago.

The long-range model, while favoured by most linguists who have considered this topic (Bickerton 1990, 1996; Aitchison 1996; Dunbar 1996), enjoys little support from archaeologists. It postulates a very significantly longer use of symbolism by hominids, at the very minimum in the order of several hundred millennia, but more probably one

million years or more. Thus there is a significant difference between these two entirely incompatible paradigms. The short-range model attributes symbolism, and all it entails, solely to what has often been described as 'anatomically modern humans', or *Homo sapiens sapiens*, or simply 'Moderns' (Gamble 1994). It declares categorically that earlier hominids possessed neither language, art-like products, social systems, self-awareness, or even proper culture. These certainties are not based on what is often called the 'archaeological record', but on the very strong postulates of the 'African Eve' model (also called 'Garden of Eden' or 'punctuated equilibrium' model) that the Moderns evolved in genetic isolation in sub-Saharan Africa, some time between 200 and 100 ka ago. They then began a migration across Africa and out of Africa, reaching the Levant by 100 ka ago, and colonizing Asia and Australia by 60 ka BP (before the present time), and Europe some 20 ka later. In the process, they either out-competed or exterminated all resident human populations, wherever they went, and always without interbreeding with them. By about 28 ka BP, all other human populations had become extinct, by one means or another, and the genetically pure, victorious Moderns had taken over the world.

This is what the majority of archaeologists believe today, particularly in the English-speaking world, and this is a main foundation of the idea that symbolism was the exclusive preserve of the Moderns. In fact the faculties derived from symboling abilities are thought to have been a principal factor in the evolutionary success of Moderns. According to this school of thought, all earlier hominids lacked these abilities, and consequently effective communication and social structures that were so useful in the effective colonization of the world through the progeny of Africa's Eve.

It is therefore essential to consider the African Eve model before one can realistically examine the advent of human symboling abilities. It is, however, not the only relevant issue. The second topic to be considered in my paper is the question of the type of evidence one needs to review to arrive at a realistic perspective. Here, the two opposing schools agree on some points, while disagreeing on others. For instance, it seems to be

widely agreed that marine navigation, the ability to cross the ocean by means of a vessel, is adequate evidence to demonstrate the existence of an effective communication system — particularly when the ocean crossing is followed by the successful establishment of a new population. On the other hand, there is much disagreement about the function or purpose of many archaeological finds that have been suggested to indicate the use of art or symbolism. I shall therefore select a particular class of finds which realistically leaves no valid doubts concerning its function, which provides us with a great deal of information about technology, and which, most of all, is capable of telling us even more about the semiotic capabilities of the population concerned. In the present paper I will endeavour to concentrate on lines of enquiry and transparent arguments that can withstand critical appraisal.

African Eve: a major archaeological fallacy

The most obvious deductions to be made from the Eve model are that our victorious ancestors first conquered the world during the Late Pleistocene, that they were genetically superior to their contemporaries of that period, and that all extant human populations originate from a small, isolated population from some small part of Africa. Indeed, ultimately they all descend from one single female, dubbed Eve. They were the only humans who ever succeeded in crossing that Rubicon between the subhuman and the human, between instinct and intelligence, between absence and presence of culture.

At first sight, this model has the appearance of a rather harmless origins myth or religious doctrine. It certainly does not resemble a realistic model of phylogenetic evolution or demographic population dynamics. Perhaps more pertinently, especially in the setting of the ideology of the 1990s, it also illustrates what happens to a non-competitive population, it extols the virtues of competition, it explains and justifies colonization as a historical phenomenon and as an inevitable process. So it is not just a simplistic and naive, but harmless mythology, it can be used to underpin and legitimize quite insidious ideologies, by appealing to ‘common sense’ and prejudice. Moreover,

since this pernicious model practically dominates archaeological thought nowadays, it determines current dogma in that discipline, and thus dictates research directions and priorities. This would be perfectly acceptable if it were based on an unrefuted proposition of scientific status, but this is not the case at all. The Eve model is based on a controversial proposition of *some* geneticists (and opposed by others), and there is no archaeological evidence in its favour, none whatsoever. In fact all relevant archaeological data seem to indicate that this model must be false. And yet, incredibly, the discipline of archaeology has succumbed to an implausible model imported from another discipline, without even considering how this model stands up to well-established archaeological knowledge.

Even the genetic justification is far from impeccable. Different research teams have produced different genetic distances in nuclear DNA, i.e. the distances created by allele frequencies that differ between populations (e.g. Vigilant et al. 1991; Barinaga 1992; Ayala 1996; Brookfield 1997). Some geneticists concede that the model rests on untested assumptions, others even oppose it (cf. Barinaga 1992; Templeton 1996; Brookfield 1997). The various genetic hypotheses about the origins of Moderns that have appeared like mushrooms over the past decade place the hypothetical split between Moderns and other humans at times ranging from 17 to 889 ka BP. They all depend upon preferred models of human demography, for which no sound data at all are available. This applies to the claims concerning mitochondrial DNA (‘African Eve’) as much as to those citing Y chromosomes (‘African Adam’). The divergence times projected from the diversity found in nuclear DNA, mtDNA, and DNA on the non-recombining part of the Y chromosome differ so much that a time regression of any type is now extremely problematic. Contamination of mtDNA with paternal DNA has been demonstrated (Gyllensten et al. 1991) and Kidd et al. (1996) have shown that, outside Africa, the elements of which the haplotypes are composed largely remain linked in a limited set of them. The genetic picture in Africa as well as outside of Africa has recently been found to be far more complicated than the Eve proponents ever envisaged. Assumptions about a neutral mutation rate and a constant effective

population size are completely unwarranted, and yet these variables determine the outcomes of all the calculations. For instance, if the same divergence rate as one such model assumes (2%-4% base substitutions per million years) is applied to the human-chimpanzee genetic distance, it yields a divergence point of 2.1 to 2.7 million years, which we consider to be unambiguously wrong. Nei (1987) suggests a much slower rate, 0.71% per million years, according to which the human-chimpanzee separation would have occurred 6.6 million years ago, which is close to the estimate from nuclear DNA hybridization data, of 6.3 million years. But this would produce a divergence of Moderns at 850 ka BP, over four times as long ago as the favoured models, and eight times as long ago as the earliest fossils of Moderns ever found. Interestingly, when the same 'genetic clock' is applied to dogs, and suggests that the split between wolves and dogs occurred 135 ka ago, archaeologists reject it on the basis that there is no palaeontological evidence for dogs prior to about 14 ka BP. In other words, the weak theory that provides the only basis for the African Eve scenario is rejected when applied to other species. Clearly we are not dealing with archaeology here, but with archaeo-lore.

Instead of unambiguously showing that Moderns originate conclusively in one region, Africa, all the available genetic data suggest that gene flow occurred in the Old World hominids throughout recent human evolution (Templeton 1996). *Homo sapiens sapiens* has evolved as a single unit across much or most of the region then occupied by hominids, from southern Africa to eastern Asia. The most recent studies have resulted in radically different views than those of the African Eve protagonists, e.g. that modern humans evolved from two discrete populations, one resulting in modern African, the other in non-Africans (Pennisi 1999). In the absence of any reliability of the proposed rates of nucleotide changes and the many variables still to be accounted for effectively, the claims by the replacement advocates are clearly premature, and nucleotide recombination renders their views fundamentally redundant (Strauss 1999).

The archaeological evidence is even more unambiguous. If there had been a mass

migration out of Africa, by a technologically, cognitively and intellectually superior human species, one would expect to find their arrival marked by a new technology, new tools, new types of subsistence extraction methods and so forth. There is not one iota of evidence, anywhere in the world, that would suggest the arrival of any innovation coinciding with the arrival of Eve's supposed prodigy. On the contrary, there is ample evidence that, wherever the Moderns appeared and co-existed, often for long time spans, with archaic *Homo sapiens* (such as neanderthaloids), they invariably adopted the life style and technology of the resident archaic populations. This applies at least in the Levant and southwestern Europe, but probably also in central Europe, eastern Europe and eastern Asia, as well as in most regions of Africa. Moreover, there is no indication that the superior Upper Palaeolithic technology first appeared in Africa. On the contrary, the Middle Stone Age of sub-Saharan Africa, where Eve's 'tribe' is supposed to have evolved in total genetic isolation, continues right up to 20 ka, and there is certainly no trace of a superior technology moving northwards. Upper Palaeolithic traditions first appear between 50 and 40 ka ago in southern Siberia, at sites such as Makarovo 4/6 and Kara Bom, and seem to be a technological response to relatively cold environments. Their advent in Spain about 40 ka ago predates the demise of the Neanderthals there by at least 10 ka. The Châtelperronian of France, clearly an Upper Palaeolithic culture, was a cultural tradition of Neanderthals, and it included the production of complex symbolic artefacts, such as beads and pendants (Figure 1). The Neanderthals used dwellings similar to those of later Upper Palaeolithic peoples in Russia and the Ukraine (such as the mammoth bone huts), and there is ample evidence, in eastern as well as central Europe, for a continuous technological as well as phylogenetic evolution of humans from Middle to Upper Palaeolithic times (Bednarik 1995a). There are numerous finds of intermediate homi-nids, displaying both archaic sapienoid and anatomically modern characteristics, including those from the following sites: Mladec Cave, Krapina, Vindija Cave, Hahnöfersand, Largo Velho, Crete, Starosel'e, Rozhok, Akhshtyr', Romankovo, Samara, Sungir', Podkumok, Khvalynsk, Skhodnya, Narmada, Jinniushan, and several more Chinese sites. These show either

that there is no genetic separation of Neanderthals and other humans at the time, or that neanderthaloid forms have contributed to the subsequent human populations (Roginsky et al. 1954; Yakimov 1980). The sapienization process in human evolution occurred not in one region, or in one closed population, but probably widely across the Old World. Precisely the same can be observed with the development of technology, wherever populations were not isolated by barriers such as high sea levels, deserts, mountains or glaciers. For instance, in central Europe, technological traditions such as the Bohunician (intermediate between a levalloid Mousterian and an Aurignacian; Svoboda 1993), the Szeletian (an early Upper Palaeolithic industry with features of the Micoquian; Allsworth-Jones 1986) and Olschewian (an archaic Aurignacian found in cave bear lairs; Bayer 1929) show through their intermediate characteristics that the Upper Palaeolithic was not imported, it developed locally and gradually. In eastern Europe, the chronologically corresponding Strelets and Spitsyn cultures exhibit similar technological patterns, with the former especially showing a long persistence of Mousterian points, even beyond 30 ka (in general, these intermediate industries are between 40 and 32 ka old), while at the same time producing vast numbers of beads. A similar pattern still persists in eastern Asia, for instance in the two substantial occupation layers of Shiyu in China (Bednarik and You 1991). Thus the picture of a sudden change from Middle to Upper Palaeolithic occupations is limited to a few western European sites, whereas in most of Eurasia, there is a gradual technological evolution (Bednarik 1995a), and nothing to indicate the sudden appearance of a new race of people.

The discovery of what has been claimed to be a common ancestor of both Neanderthals and Moderns at Atapuerca in Spain (Arsuaga et al. 1993) only confirms the close relationship between the two hypothetical groups. I say ‘hypothetical’ because we lack any real proof that Neanderthals differed from Moderns in any way other than some skeletal features, and they were certainly a form of *Homo sapiens*. The most probable explanation for their archaic features is that at certain times, determined by the periodic times of cold climate, European populations became rather isolated from the main body

of Old World hominids. The type fossils of the Neanderthals, the late 'classical Neanderthals', are far from being typical specimens. They probably represent regressive marginal populations, and to use their very fragmentary DNA data, as has been attempted recently, to explore the evolutionary history of the human mainstream population of Africa and Asia is futile. The DNA of the original specimen from the Kleine Feldhofer Grotte of the Neander valley probably tells us nothing about the origins of extant humans.

The greatest shortcomings of the African Eve model of human evolution, however, have not been mentioned so far. To survive, this model has to deny any knowledge of evidence suggestive of complex technologies and, most particularly, of symboling abilities prior to 100 ka ago. It has done this by several strategies so far, all of which are now becoming undone. First, most reports of advanced hominid abilities predating the advent of Moderns have been rejected out of hand, either as being unreliable or as being susceptible to alternative explanations. Those finds that could not be swept under the carpet were grudgingly accepted as flukes, as the work of unusually gifted individuals, even as evidence of 'running ahead of time' in human development (Vishnyatsky 1994). Their claimed small number was often cited as being enough reason to ignore them (Chase and Dibble 1987; Davidson and Noble 1989). When in response it was pointed out that their number was actually very much greater than assumed (Bednarik 1992a), the response was that this still made no difference to interpretation. As always in anthropocentric and humanistic disciplines, the definition of what indicates characteristics such as culture or language are always revised in response to the threat that such characteristics might be attributed to non-human interloper species. This is one of the classical symptoms of a non-scientific pursuit, because in reality there can be no doubt that humans do not possess one single definable, measurable or observable characteristic that is not shared by another species. Thus the desire to maintain a clear qualitative separation between humans and non-human animals is attributable to the religio-cultural reality scholars exist in.

This is particularly obvious in the case of the eager acceptance of the African Eve hypothesis, a model that is entirely devoid of archaeological evidence, is in fact contradicted by all available archaeological evidence, and is supported only by questionable, highly controversial numbers-crunching computer games of *some* geneticists. It is no coincidence that this hypothesis is framed within Biblical metaphors. There is not only Eve, the mitochondrial founding mother, there is also a Y-chromosome Adam, from whom all modern humans are supposed to descend, there is a 'sub-Saharan Eden', and the experimental, incredibly complex evolutionary tree scenarios are termed 'Deluge runs'. These facetious terminologies are not intended to refer to serious models, and they are often coined by the media rather than the researchers, but they are eagerly absorbed by fundamentalists of all shades, and this is not particularly helpful. The researchers may not be responsible for the misinformation of the public by these means, but they are, in my view, responsible for not speaking out adequately when their hypotheses are reinterpreted by religious commentators.

Technologies before Eve

A balanced model of human cultural evolution can only be gained from an unbiased study of the technology and symbolic evidence of hominids. As soon as we consider the technological evidence of the Lower and Middle Palaeolithic periods, we encounter a significant bias of preservation — but not of preservation alone. Practically all publications about very early technology deal primarily with stone implements, which is a result of taphonomically imposed limitations. This limits our knowledge of technology very significantly, because in reality, stone tools were always a numerically minor component of early material cultures. Considerations of technology should include not only the use of non-lithic materials, but also the questions of procuring all materials used, their trans-port, curation, storage, processing, preparation, manu-facture and maintenance.

The very significant under-representation of artefacts from relatively perishable

materials has prompted dis-torted technological characterisations of Lower Palaeoli-thic traditions. For instance, bone, ivory, fibre, leather or wood are poorly represented, if at all — although there are in fact far more wooden finds from the Lower Palaeolithic than from the Upper Palaeolithic (in most of Eurasia, c. 35 ka to 10.5 ka ago). The technology of Lower Palaeolithic wood working has never been examined in a consistent and comprehensive fashion, even though we know that the period's stone tools were primarily used to work wood (Keeley 1977). The same applies to the Mid-dle Palaeolithic (in most of Eurasia, c. 150 ka to 35 ka ago) (Beyries 1988). For instance, microwear studies by Anderson-Gerfaud (1980, 1990) of lithics from Pech de l'Azé, Corbiac and other sites showed that only about 10% were used for working hides, while the majority served to fashion wooden objects. There can be no doubt that astronomical numbers of wooden tools and weapons were made before the Upper Palaeolithic, but almost none survived from the Middle Palaeolithic. From the Lower Palaeolithic, we have a minute sample, but even this has not been considered in a collective technological perspective. An example of sophisticated woodworking from the Lower Palaeolithic is the Acheulian plank of willow wood, shaped and bearing anthropic polish, from Gesher Benot Ya'aqov, Israel (Belitzky et al. 1991; Bednarik 1991). It is of the Middle Pleistocene and at least 240 ka old. The probably older yew spear point from Clacton-on-Sea, England (36.7 cm long, found in 1911), and the complete spear found among the ribs of an elephant skeleton at Lehringen, Germany (Jacob-Friesen 1956), have long been known. The hunting spears from Schöningen were carefully fashioned from spruce wood. They are 1.82 to 2.30 m long and as carefully balanced as mod-ern javelins. These are aerodynamically designed, sophisticated hunting weapons, and they are about 400 ka old. Schöningen has also produced other wooden arte-facts (Thieme 1995), among them two notched staffs which are thought to have been hafts for stone flakes. At 400 ka age, they would be the earliest evidence of hafting in the world. There was also a flat wooden artefact found embedded among the remains of a butchered animal which is thought to be from a lance. Another apparent wooden lance (2.5 m length) comes from the travertine deposit

of Bad Cannstatt (Wagner 1990). A fragment of a Lower Palaeolithic wooden lance or spear was found at yet one more German site, Bilzingsleben, a site that yielded also other wooden fragments. Possible wooden lances (Howell 1966: 139) were found among the many elephant remains of Torralba, Spain, mostly early this century, but details are fairly sketchy. A number of wooden tools and weapons were excavated at the Kalambo Falls site in Zambia, which is of the late Acheulian, one of the principal Lower Palaeolithic tool traditions. Wooden remains are less com-mon from the subsequent Middle Palaeolithic, but we have a thin, worked and stone tool-shaped plank of mul-berry wood from Nishiyagi, Japan (Bahn 1987); a curved wooden implement with parallel markings on the end from Florisbad, South Africa (Volman 1984); and several shallow wooden dishes from the Mousterian in Abri Romani in Catalonia, Spain.

In addition to having provided the earliest known apparent evidence of tool hafting, German archaeologists have also found the earliest solid evidence of resin use for stone tool hafting. The Mousterian of Königsaue and Kerlich has provided not only resin fragments, but also resin with imprints of both wooden haft and stone tool, as well as the complete hafted tool (Mania and Toepfer 1973). Middle Palaeolithic hafting resin was also found in the Bocksteinschmiede, Germany (Bosinski 1985), and at Umm el Tlel, Syria (bitumen on two tools; Boëda et al. 1996). Moreover, Hayden (1993) describes the indirect evidence of hafting on Levallois and Mousterian points as ‘copious’, and the tanged Aterian tools of northern Africa were apparently designed specifically for hafting.

There is a further misapprehension among some archae-ologists that bone points, and the skilled use of bone, ivory and antler generally, do not appear before the Aurignacian. This is also incorrect. Salzgitter-Leben-stedt, a German Micoquian site, alone provides ten bone points, mostly on mammoth ribs, besides the delicate and complex ‘winged point’ and an antler implement (Tode 1953). The polished Bilzingsleben ivory point is not just Lower Palaeolithic, it even seems to bear an

engraving (Bednarik 1995b). Ivory points occur also in the Acheulian, for instance at Ambrona, where Howell and Freeman (1982) suggested that they may have been hafted. Even bifaces ('handaxes') have been made from bone, e.g. the specimen from Rhede, Germany (Tromnau 1983). During the Mousterian, bone was used widely, including for the building of dwellings (at Staro-sel'e), a use some archaeologists think was restricted to the Upper Palaeolithic.

Despite the dramatically distorted record from the Lower Palaeolithic, there can be no doubt that these hominids as well those of the subsequent Middle Palaeolithic had a technology that cannot be defined from stone tools alone, the only type commonly found. We also know that underground mining was conducted in the Middle Palaeolithic/Middle Stone Age (Bednarik 1995c), but perhaps the most dramatic evidence we have of very early technology is that *Homo erectus*, the species before *H. sapiens* appeared, had seafaring capability (Bednarik 1997, 1997). We know that hominids reached the island of Flores, in the Lesser Sunda Islands of Indonesia. These islands were never connected to the Asian mainland, at any past sea level, and the only way the hominids could have reached and settled them is by means of seagoing vessels, presumably bamboo rafts. Although we have no skeletal remains of the descendants of these first seafarers, we do have large numbers of stone tools from a series of sites on Flores, and also on Timor, further east (Bednarik 1999), excavated together with extinct fauna, and dated to 850 or 750 ka at Flores. This is well before the first archaic *Homo sapiens* forms appeared. Even the most determined opponents of the long-range model of symbolic development and language, Davidson and Noble, have always accepted that seafaring ability proves language use, but unfortunately they were unaware that such an ability was available to hominids over three quarters of a million years ago. The evidence for this is by no means new, it has been available for the past 40 years, but until very recently only in German (Verhoeven 1958; Maringer and Verhoeven 1970; Sondaar et al. 1994).

While the navigational prowess of *Homo erectus*, the greatest colonizer in the 2.4

million years of human history (Bednarik 1997c, 1999), is by itself sufficient evidence to show that the capacity of reflective communication, presumably by verbal means (i.e. language), was available at least 850 ka ago, there are still a few other technological points to consider. The construction of rafts is contingent upon the use of cordage of some type, in the form of vines, sinews, fibres or whatever similar material. This demands further complexities in the available technology. Most importantly, cordage of any type can only be employed usefully by means of knotting. Strings, ropes and thongs were no doubt used for much of the Palaeolithic, but we have no physical evidence of knots and almost none of cordage, except from the Upper Palaeolithic (Leroi-Gourhan 1982; Nadel et al. 1994). The use of hunting nets has been suggested for the Gravettian of Pavlov, Czech Republic, after the impressions of weaved plant fibres were observed on burnt clay sur-faces of 26-25 ka age (Pringle 1997).

War-ner and Bed-narik (1996), in reviewing the issue, traced the assumed use of cordage back through its depiction in Upper Palaeolithic art and the much earlier occur-rence of drilled objects such as beads and pendants, and via other indirect evidence. This indicates that some form of strings must have been in use during Lower Palaeolithic times already. Artificial perforation of small objects suitable as beads or pendants appears about 300 ka to 200 ka ago, according to current knowledge. The kind of technology used in their production seems to provide a realistic means of gouging the true technological capability of the earliest period in the history of humans, the Lower Palaeolithic. It will be reviewed in a separate chapter below, but it should be mentioned here that, in summary, the technology of the hominids before the ‘Eve of Africa’ was complex enough to refute one of the main premises of the Eve hypothesis: that it was Eve’s prodigy who introduced language, complex technology, and several other aspects of human culture. Nothing could be further from the truth.

The origins of symbolism

We have already seen that one form of symbolism, language, probably began its

development some time between the appearance of *Homo erectus* (about 1.8 million years ago, at which time the species is found in eastern Africa, in the Caucasus and on Java) and his first known crossing of the open sea (perhaps 0.9 million years ago, from Bali to Lombok and then Flores). Verbal language is a form of communication that involves the use of conventionalized vocal sounds in meaningful patterns. Any form of communication requires the use of symbolisms, but in order to develop beyond simple action and response patterns (which apply, in various complexities, throughout the animal world), culturally determined meanings need to be attached to the 'signs'. In other words, such meanings are not genetically passed on, but are acquired during the life trajectory of each individual; they are learnt. Culture is of course not limited to humans, it is available to many other animals, albeit in considerably less complex forms. In humans culture has reached extraordinary levels of complexity, which are only possible through the use of an unusually large brain.

The question is therefore not really, when did culture begin, but rather, it should be asked: when did culture (individually acquired system of 'understanding') begin to become such a dominating determinant of selection that it began to rival environmental factors in determining the course of evolution, especially cognitive evolution, for hominids? In other words, when did our ancestors begin to exercise sufficient control over environmental variables that a neural feedback system emerged which led to consciousness, and thus to what we regard as conscious modulation of response patterns? Such a development made the proliferation of cultural systems almost inevitable, and the increasing skill in the use of symbolisms became a necessity. The short-range model of cognitive evolution, epitomized in the African Eve hypothesis, perceives this development as having occurred during the Upper Pleistocene (127 ka to 10.5 ka BP), concurrent with the assumed migration of Moderns out of Africa. All earlier hominids were incapable of symbolism, including language. In the most extreme form of this hypothesis, language is only possible as a result of figurative depiction, of which we have no evidence older than 32 ka (Davidson and Noble 1989), and earlier hominids belong to the apes rather than the humans (Davidson and Noble 1990).

According to the long-range model, this was a slow and gradual process that was already in progress at the time of the first humans, 2.5 to 2.3 million years ago. The marked encephalization in the earliest humans, such as the habilines, which led to massive increase in cranial capacity among early hominids, is seen as being related to cognitive development. The oldest archaeological find known in the world that has been suggested to indicate a hominoid ability to recognize iconic resemblance (the visual similarity of two otherwise unrelated objects) is the Makapansgat cobble from South Africa. It appears to have been deposited in a cave by *Australopithecus africanus* almost 3 million years ago. The cobble (Figure 2) is of a conspicuously reddish jasperite and has the natural form of a head, with distinctive 'staring eyes' and a 'mouth' (Bednarik 1998). It cannot occur naturally in the dolomite cave, and at the time in question, no humans appear to have existed who could have carried it into the cave. This extraordinary find was made in 1925, but remained largely ignored. 'Staring eyes' motifs can lead to visually determined reactions even in insects and birds, responses to them appear to be deeply embedded in neural systems, and apes as well as humans have a clear preference for the colour red (Oakley 1981). It is therefore perfectly possible that australopithecines were so fascinated that they carried the cobble around, and eventually left it in the cave which also contained their remains. While this does not necessarily demand full symboling ability, it does suggest the existence of incipient neural structures that would make it possible to recognize the relationship between signifier and the signified in a more systematic pattern, i.e. symbolism as we perceive it.

But when could we expect such an ability to have developed sufficiently to have a major impact on the behaviour of hominids? By 1.5 million years ago, *Homo erectus* began to produce formalised tools suggestive of mental templates, 'handaxes'. By that time, that species has successfully occupied vast areas of the Old World, apparently within a geological instant, adapting no doubt to many environments and climates in the process. If there were a hominid predisposition to achieve this, it would have been attempted

earlier, so the evidence suggests the availability to this species of a conceptual tool not available 2 million years ago. Before speculating what this might have been, we need to consider the next major development. By about 850 ka ago, *H. erectus* has acquired seafaring ability and he also used manuports that seem to have no utilitarian significance. He collected two types of minerals and we find them deposited in his occupation sites. Clear quartz crystals occur first in South Africa, soon after in India and then elsewhere (Bednarik 1994a). Sometimes these are so tiny that they could not possibly have been used as tool material, and they bear no traces of wear. It seems that they were collected for their exotic visual properties, and hominids of the period are also thought to have taken a special interest in fossil casts (Oakley 1981). At about the same time, perhaps 800 ka ago, we have the first evidence that hominids collected red mineral pigments (haematite or ochre), again in South Africa (Wonderwork Cave) and India (Hunsgi), followed much later by several sites in France, Spain and the Czech Republic. We cannot know what the colouring material was used for, except that one of the Hunsgi specimens bears traces of having been used as a crayon on a rock surface (Bednarik 1990). However, it is not very important whether the haematite was used to colour rock surfaces, artefacts, animal hides or human bodies, in all cases such use would imply distinctive cultural behaviour. Since the first use of such materials coincides with the first clear evidence of advanced language use, through seafaring, it seems reasonable to propose that by 850 ka ago, hominids had developed numerous distinctive forms of cultural behaviour, various forms of symbolism, and technologies that would not be significantly improved until the advent of the Holocene, a mere 10.5 ka ago. At that stage, human society had come to depend so much on culture that we can assume essentially modern behaviour patterns to have begun to emerge.

It therefore appears hat the most likely time frame for the crucial developments in establishing the role of symbolism in human culture is that these developments commenced with the rapid expansion of *Homo erectus*, perhaps 1.8 million years ago, and resulted in structured societies with complex technology, modes of symbol use and effective language about a million years later. From there on, the cognitive and

intellectual evolution of hominids merely followed an established trajectory demanding accelerating refinement. There are home bases with established activity zones, increasing use of fire, specialized hunting of very large animals (especially elephants and rhinos), refinement of weapons and artefacts, and increased use of red and later also other pigments.

The next major step, however, seems to occur around 300 ka ago, still in the Acheulian, the perhaps most widespread technological tradition of the Lower Palaeolithic. 'Palaeoart' is now being produced in several world regions, and in various forms. Engravings on portable objects of bone, ivory and stone commence about that time, with the sites Bilzingsleben (Mania and Mania 1988; Bednarik 1995b), Stránská skála (Valoch 1987) and Sainte Anne I (Crémades 1996) being early representatives. The earliest 'protosculpture' is the Acheulian scoria pebble from Berekhat Ram, Israel, which like the Makapansgat cobble is a natural form, but one that has been altered by human hand (Goren-Inbar 1986). It has the natural shape of a female torso, head and arms, but bears engraved grooves in various places (Marshack 1997). Petroglyphs appear first in the Acheulian of India, in the form of cupules and one engraved meandering line (Bednarik 1993a). The cupule is particularly noteworthy, because it represents the earliest form of rock art in most continents. For instance the oldest known rock art of Europe are the 18 cupules on the underside of a stone slab placed over the grave of a Neanderthal child in La Ferrassie, France (Peyrony 1934), but these are far more recent than those of the Acheulian in India.

Between 170 and 130 ka ago, the Lower Palaeolithic period gradually makes way for the Middle Palaeolithic, bringing further changes in technology. The Levallois technique and the use of 'handaxes' continues, but greater differentiation becomes evident in lithic traditions. Symbolic evidence, such as palaeoart (Bednarik 1994a), occurs widely in the Micoquian and Mousterian of Europe, in the Middle Stone Age of sub-Saharan Africa, and the Middle Palaeolithic industries of Asia and Australia (which in the latter continent continue to the end of the Pleistocene, and in Tasmania to

European occupation). Seafarers of this period achieve incredible ocean crossings in the region to the north and northeast of Australia (Bednarik 1997a), and underground mining occurs in Europe, two regions of Africa, and in Australia (Bednarik 1995c). None of these developments are attributable to the supposed descendants of Africa's Eve, in fact there is not a single technological, cognitive or symbolic innovation that can be traced to their appearance. If that tribe or race ever did exist as a genetically discrete entity, for which there is no evidence other than the claims of *some* geneticists, then that 'race' contributed little to the human ascent. All fundamental innovations and achievements predate them, and the greatest or most important are squarely attributable to *Homo erectus*.

Beads of the Middle Pleistocene

In my brief review of the early development of symbolic capacities I have neglected one form of evidence, saving it for special consideration. One of the principal arguments levelled against evidence suggestive of very early symbolism is that there are perfectly valid alternative explanations. This is indeed often the case. Natural surface markings of portable objects of various types have been misinterpreted as meaningful engravings in literally thousands of cases world-wide. I have examined and rejected hundreds of instances (600 in China alone). By far the most common examples are objects of bone, limestone, ivory and ostrich eggshell, which I have shown to bear mycorrhizal grooves that may resemble engravings (Bednarik 1992b). Bone fragments often bear markings made by animal canines, by gastric acids (e.g. of hyenas), or by other taphonomic agents of various types (trampling, sediment movement, solifluction, cryoturbation, etc.). Another very common example are perforated bone fragments and shells, which some archaeologists have interpreted as anthropic products — intentionally made by humans. Bones can be perforated by animal teeth and corrosive agents, gastropod shells are commonly bored through by parasitic organisms. Similarly, natural surface markings on rock have often been archaeologically misinterpreted, and again I have corrected numerous such instances, in which either natural markings were identified as

rock art, or rock art as natural markings (Bednarik 1994b).

Some commentators on the issue of whether perforations of Pleistocene objects were natural or artificial apparently make a fundamental error of logic (d'Errico and Villa 1997). They seem to believe that, in order to be considered to have been used as a bead, a perforated object must have been *made* by humans. Any consideration of the kinds of objects used as ethnographic beads will readily show this to be false. The correct logic is that one may be able to demonstrate the use of a bead in some cases from microscopic evidence (Bednarik 1997d), but one can never demonstrate that any perforated small object found in an occupation layer was *not* used as a bead. In view of the widespread use of beads today, and the frequency with which they are lost, and considering further that beads were in use for some hundreds of millennia (as we shall see below), almost certainly in large quantities, it is very much more likely than not likely that most perforated objects found in an occupation layer were used as beads. The fact that we cannot prove that a naturally perforated, bead-like object was used as a bead should not prompt us simply to exclude it from consideration.

The outstanding characteristic of made beads and pendants is that their archaeological identification is usually unambiguous, which one cannot always say about other classes of symbolism evidence. Small objects, drilled through with stone tools, could be either beads or pendants, or they could be small utilitarian objects such as buckles or pulling handles, or the quangings of the Inuit (Boas 1888: Figs 15, 17, 121d; Nelson 1899: Pl. 17; Kroeber 1900: Fig. 8). Such utilitarian objects are generally of distinctive shape, use-wear and material; they need to be very robust. Small objects that were drilled through either in the centre or close to one end (e.g. teeth perforated near the root), that are too small or too fragile to be utilitarian objects, and that lack the typical wear patterns of such articles, can be safely assumed to be beads or pendants. The evidence that they were drilled with a stone tool is indicated by a distinctive bi-conical and 'machined' section and sometimes by rotation striae. The wear of pendants can often be observed on archaeological specimens, including those made of stone (Bednarik 1997d),

and is also quite typical.

An example of such complete lack of ambiguity are the disc beads made from ostrich eggshell. These are extremely common in the ethnography of southern African people (Woodhouse 1997), and in the archaeological record they are found from there to China and Siberia (Bednarik 1993b). The ostrich (*Struthio camelus* ssp.), now extinct in Asia, was widespread in much of Africa and Asia to the end of the Pleistocene, apparently even into the Holocene. Its eggshell was used widely, as containers and especially as decorative material, particularly in the Late Pleistocene and early Holocene. In southern Africa, such use extends from the present back to the Middle Stone Age. Decorated fragments have been reported from the Howieson's Poort phase in Apollo 11 Cave, Namibia (Wendt 1974), from the Middle Stone Age of Dieplkloof Cave in the southwestern Cape area (Beaumont 1992) and as beads from Bushman Shelter in Transvaal (Woodhouse 1997), both in South Africa. Some of these may be up to 80 ka old, and many more recent traditions have used such disc beads. In Tunisia and Algeria, Capsian occupation deposits have yielded ostrich eggshell beads frequently, and these date from the very early Holocene. In India, 41 Late Pleistocene sites have produced ostrich eggshell fragments, and radiocarbon dates derived from such fragments range from 39 to 25 ka (Kumar et al. 1988). At two sites, Patne and Bhimbetka, a few disc beads have been found. The two specimens from Bhimbetka come from the neck region of a human burial, which suggests that they may have formed part of a necklace (Figure 3a-c). Similar beads occur in the Gobi desert of northern China, where they are found among the occupation remains of an Epipalaeolithic or even Mesolithic tool tradition usually named after the site of Shabarak-usu (Bednarik and You 1991). Further finds of ostrich eggshell disc beads, of roughly similar age (final Pleistocene to early Holocene), have also been reported from Inner Mongolia (Hutouliang) and southern Siberia (Krasnyi Yar, Trans-Baykal).

Of a substantially greater antiquity are the three similar ostrich eggshell beads from El Greifa site E, in Wadi el Adjal, Libya (Bednarik 1997d). They come from a substantial

sequence of Acheulian occupation deposits representing many millennia of continuous occupation of a littoral site, on the shore of the huge Fezzan Lake of the Pleistocene. This site has exceptionally good preservation conditions, with insect remains and seeds found together with bone. The typical Late Acheulian stone tool forms, including 'handaxes', confirm the dating of the occupation strata by Th/U analysis to about 200 ka. These are the earliest known secure disc beads in the world, and there can be no reasonable doubt that they are indeed man-made beads, and not some chance product of nature (Figure 3d-f). In addition to the three found initially, several more beads have most recently been recovered from the same site and period (M. Kuckenburg, pers. comm. Jan. 2000).

However, they may well be exceeded in age by two other finds, the pendants from one of the occupation layers in the Repolusthöhle, in the Austrian Alps. A wolf incisor is perforated near its root, and a flaked bone point near its corner (Figure 4). These specimens occurred together with a large but non-diagnostic stone tool assemblage (Mottl 1951), variously described as Levalloisian, Tayacian and Clactonian, three rather vaguely defined Lower Palaeolithic industries. There is no radiometric dating available, but the accompanying faunal remains imply an age of about 300 ka, especially through the phylogeny of the bear remains. Previous estimates had been in the order of only 100 ka. This is not a very precise, but nevertheless quite plausible, dating, particularly as ursine phylogeny is very well established in the region.

These finds from Libya and Austria indicate that beads and pendants were made and used in the Acheulian or other Lower Palaeolithic cultures. This renders it possible to consider in this context also naturally perforated, bead-like objects that have been found in occupation deposits, or together with stone tools of the general period. While one may not be able to 'prove' conclusively that they were used as beads, that possibility must not be excluded now that we know that Lower Palaeolithic hominids *did* make beads. The first known reports of Palaeolithic stone tools already made mention of the occurrence of centrally perforated fossils together with Lower Palaeolithic 'handaxes' at

the type site of St. Acheul in France (Prestwich 1859: 52):

> Dr. Rigollot also mentions the occurrence in the gravel of round pieces of hard chalk, pierced through with a hole, which he considers were used as beads. The author found several, and recognized in them a small fossil sponge, the *Coscinopora globularis*, D'Orb., from the chalk, but does not feel quite satisfied about their artificial dressing. Some specimens do certainly appear as though the hole had been enlarged and completed.

Perforated fossils have also been found in the Acheulian of Israel, from which Goren-Inbar et al. (1991) report the occurrence of fossil crinoids. This raises the question, how widespread could the use of beads or pendants have been in the Lower Palaeolithic, and how far back could it have extended in time. We cannot answer this by archaeological observation and reasoning alone, but a credible scenario can be provided by taphonomic logic. If the earliest found representatives of a class of material evidence are among the most deterioration-resistant types of that class, then the probability of significantly older, less resistant types is very high indeed. Ethnographic beads are often made of perishable materials, such as seeds, and materials like ostrich eggshell can only survive in high-pH soils. A significant observation we can make from the available finds of Pleistocene beads and pendants is that they are extremely rare, and that they are widely separated, both chronologically and spatially. Beads cannot, by definition, occur in isolation. To possess and convey meaning, they need to occur in large number in any society that uses them, because symbolic meaning can only be conferred by repeated and 'structured' use. Therefore we need to assume that we are dealing with a severely truncated record here, a phenomenon whose taphonomic threshold is much more recent, certainly within the Holocene. When we bear in mind that one single site in Russia, of an Upper Palaeolithic tradition with distinctive Middle Palaeolithic roots (the Streletsian), has yielded more beads from just three graves than the remaining Pleistocene of the entire world, the extent of taphonomic distortion becomes evident. The three burials at Sungir', perhaps in the order of 28 ka old,

yielded 13,113 tiny ivory beads and over 250 perforated fox teeth. This should be seen as a preservational fluke, and as an indication that the few earlier beads we have from the previous couple of hundred millennia represent all that we have managed to recover from the astronomical numbers of beads made in the Lower and Middle Palaeolithic. Taphonomic logic demands this (Bednarik 1994c: Fig. 2).

Making beads

In exploring the symbolic significance of beads, archaeologists are likely to mention their occurrence in burials, or wax lyrically about ‘decoration’. These discussions are too shallow to permit us any real progress. What does it mean that a particular condition is perceived as ‘decorative’? Does a non-human animal perceive beads, or cicatrices, body painting or tattoos on a human body as ‘decorative’? Probably not. So this is very probably an anthropocentric perception, it is not likely to be shared by either animals or an intelligent visitor from outer space. The latter is likely to regard beads as having some unfathomable utilitarian function, at least initially.

Beads, whether sewn on apparel or worn on strings, have symbolic meanings that are far removed from the simplistic empiricism of the Western anthropologist. They, or pendants, may for instance be protective, warding off evil spirits or spells, or they can be good luck charms. They can signify status, and convey complex social, economic, emblemic, ethnic or ideological meanings, or any subtle combinations of them. Their meanings can be public or private, but they may be difficult to convey to an alien researcher, and they could never be analyzed archaeologically. How would our interstellar visitor interpret the carved ivory figurines of an incomplete chess set? If his anthropology were as simplistic as ours he may well explain its knights as evidence of an equine cult. It is at this level that most interpreting of Pleistocene symbolism has occurred, which I find quite unsatisfactory.

It is clear from the preceding chapters that symbolic systems must have been available

to hominids by 850 ka ago at the latest. The evidence includes the collection of crystals, fossils and red pigment, besides language use as implied by maritime navigation. A variety of birds, most notably the Australian bowerbirds, collect colourful or shiny objects, some even erect display structures and paint them with plant juices. The question arises, was the hominid behaviour qualitatively different from that to be observed in such birds? We can assume, through the evidence that these hominids navigated the sea, that they had some form of 'reflective' language. We further know that they produced a variety of stone and wooden tools and artefacts, that they showed extraordinary ability to adapt to different environments and to plan ahead, and that they evolved into contemporary humans. By 300 or 200 ka ago, at the latest, their symbolic abilities had evolved to the point at which they produced rock art, portable art and beads. Of these forms of symbolic products, beads seem to tell us the most.

First, there are the purely technological aspects. To make a bead one has to, at the very least, be able to drill through an object, to thread a string through the hole, and to fasten the ends of the string, presumably by knots. To persist with such a complex process of manufacture, one must have a mental construct of the end product, and a desire to acquire what is clearly a non-utilitarian artefact. To be more precise, the bead is such an artefact, but the string is not, being utilitarian. The latter is merely a means of permitting the bead to fulfil its non-utilitarian role. So we have here a combination not only of diverse artefacts, but also a hierarchy of diverse concepts of relating to them. The primary imperative, presumably, is to display the bead to its best advantage, the secondary intent is to find a means of doing so. Now, a piece of ostrich eggshell can be worn on a string without first drilling a hole through it, so why bother with this additional work? This kind of exploration raises a whole swathe of questions, and it is through it that the beads begin to become alive with meaning and significance.

This logic-based interpretation needs to be underpinned by an intimate knowledge of the technology involved, and for this purpose I have conducted extensive replicative experimentation with ostrich eggshell between 1990 and 1996 (Bednarik 1992b, 1993a,

1993b, 1995d, 1997d). The results pertaining to disc beads manufactured with Lower Palaeolithic stone tools have been described in some detail, they are only briefly summarized here. I found that the most effective way of producing precise replicas of Acheulian and later Pleistocene ostrich eggshell beads, using such technology, is first to break the shell into polygonal fragments of 1-2 cm^2 area. These are then drilled individually, from one side only. Once the stone drill breaks through, the hole is reamed out from the other side. The specimen is then firmly gripped between two fingers, and the excess area trimmed off, either by pressing the protruding part on its convex side against a stone surface, or by using one's teeth as a vice. Once the excess material is snapped off, the bead blank is abraded on a coarse siliceous rock such as quartzite or silcrete. The three beads from the Libyan Acheulian are all of about 6 mm diameter, and I found that the average time of producing replicas of them is about 17 minutes, or about 25 minutes if the time of preparing and resharpening stone points is included (Bednarik 1997d: 33-36).

An animal tooth, such as the wolf's incisor from the Repolusthöhle, is much more difficult to perforate. At the time of the advent of Upper Palaeolithic technology, between 40 and 30 ka ago, even stone materials were perforated, to be used as pendants. The earliest examples are the broken specimen from Shiyu wenhua in central China (Figure 5) and several items from Kostenki 17, made from stone, fossil coral and belemnites (Bednarik 1995d: Fig. 4). However, the sparse record available to us provides no indication of an 'evolution' in the standard of workmanship. On the contrary, some of the older examples are much better produced than the more recent. The Libyan Acheulian beads are more carefully made than the Upper Palaeolithic specimens from India (Figure 3). The perforation on the Repolusthöhle tooth is significantly finer than the clumsily made holes in the two Bacho Kiro teeth, which are 'merely' 42 ka old (Marshack 1991). There can be no doubt that even the earliest beads and pendants we currently have involved a great deal of skill and understanding of material properties in their production. The hominids who made them were outstanding

craftsmen.

The symbolism of beads

Of much greater significance, however, are the findings concerning the symbolic qualities of the beads. In making many replicas of the Acheulian ostrich eggshell beads I discovered that the smallest size such a bead can realistically be ground down to is about 6 mm diameter. There are two reasons for this. First, as the size approaches this order of magnitude, the disc becomes increasingly difficult to hold between fingers, and as the finger tips are beginning to rub against the grind stone as the bead becomes smaller, their skin is also abraded and the process becomes quite painful when making many beads. Second, since the diameter of the central hole can be no smaller than 1.4 to 2.0 mm, it follows that the bead's fragility increases exponentially as the outside diameter of 6 mm is approached. This diameter represents the smallest size at which the bead remains structurally strong enough to withstand some rough handling. I have established this quantitatively, through controlled destruction experiments.

The next observation is even more meaningful. The Acheulian beads are very well made, with a near-perfect circular outer margin and an equally perfect rim thickness all around. In my replication work I found that these precise forms can be achieved only intentionally, by constant checking of the shape during the final abrading phase. It is practically impossible to obtain such a perfect round shape and centrality of the perforation by accident. This means that the makers had not just a well-developed sense of symmetry, but a clearly defined concept of the perfect geometric form they aspired to.

This leads to several observations. Even if it is preferred to have a perforated bead, this does not necessarily call for a *central* perforation. The rational explanation why the maker would go to such lengths to abrade the bead equidistantly is because of a sense of perfection. This proposition is confirmed by the size of the beads. It seems self-

defeating to make beads so small. Surely a purpose of a bead is to be seen, and a large bead is much easier to see than a small one. Yet the labour investment of making a very small bead is significantly greater than that required for a large bead. Perhaps the most telling aspect of the production process is that the Acheulian beads are, as noted already, of the smallest possible size in which these objects can realistically be made. There is a palpable impression that the primary objective was to push the available technology to its very limits. It is from this perspective that we need to examine these symbolic objects, and the nature of their semiotic function.

Lower Palaeolithic hominids have few models of the form-concept that would underpin the mental template of a disc bead. To our thinking, used to the idea of the wheel, this is a great deal more familiar than it would have been to early humans. Of course they may have collected circular fossils such as those reported above, and used them as beads. Perhaps this is how the very concept came into being, and the humanly made disc beads were merely substitutes, in place of the fossils that were in short supply. Whatever the process was, these hominids did possess a clear concept, applied no doubt many thousands of times, of a perfect geometric form that had no practical value at all. It may sound provocative to say this, but they had in fact developed the wheel without discovering its practical application. As one reams out the perforation it is easiest to hold the reamer still and rotate the disc around it, like a wheel. Similarly, the finished bead can be turned around the string, or one can run it along a surface like a wheel by holding the string tautly.

Naturally the hominids had no use for wheels (or means of making large-scale versions), but they may well have been fascinated by their properties. They certainly went to a great deal of effort to produce not just beads, but perfectly proportioned, ‘aesthetic’ masterworks. Even as non-utilitarian objects, the beads did not need to be so well made. There is some special significance in this perfection, this self-conscious display of ability. The product itself expresses it, it is itself a symbol. Not only does it no doubt have one or more cultural meanings of a kind that will remain inaccessible to

us, one meaning is not: the bead expresses perfection, technological confidence and competence. Its perfection is the message. It has become a symbol of achievement, and it is displayed to the beholder at least partly for this very reason. As an experienced maker of such beads I can see no other reason for wanting to create perfectly proportioned specimens of a demonstrably smallest possible size. Occam's Razor demands that there must have been a justification for this considerable labour investment in artefacts that are of no practical use or survival value. All of this tends to attribute essentially modern human behaviour patterns to hominids of the late Lower Palaeolithic.

To produce this purely symbolic object, methods were required that may have become available for non-utilitarian purpose, and to display it effectively, non-utilitarian technology had to be engaged. Cordage of some form was almost certainly used for a variety of other purposes (e.g. to construct rafts, as we have seen), and a string was threaded through the bead's perforation, and in some way fastened. So a whole interplay of different materials and production tools came together, different methods of technology, forms of procuration and maintenance, and all with one ultimate purpose in mind: to lead to the display of a perfect, and perfectly useless, tiny object, probably together with many similar objects. If the beads were used in this way, which seems highly probable, than their number would invoke yet another message, become another symbol. It would underline the message of perfection, and add one of surplus energy. This is a far cry from the bleak picture of a subsistence level existence archaeologists have always painted for early hominids.

Conclusion

It has now become obvious that the hominids who first engaged in this practice had not only a great deal of technology at their disposal, they applied and retrieved a variety of symbolic meanings, which could be attached to objects at will or through complex cultural conventions. The practice of wearing such objects as beads and pendants

obviously requires a comprehension of the self, of the existence of the individual. Individuality is a central factor in all 'decoration', necessarily, and that applies also to the pretense of perfection: there seems to be no reason to wish to project the concept of perfection in the absence of a concept of the self. Self-consciousness with all its implications is an important factor in cognitive evolution, and can be assumed to have been available to select for, probably well before the advent of beads.

In this paper I have argued that the African Eve model, which emphasizes the differences between the Moderns, the 'chosen people' of evolution, and all other hominids, has no archaeological justification whatsoever. From a biological perspective, particularly ethologically, humans are so closely related to other primates that incipient forms of even their most distinctive cognitive abilities can be observed in other species. Human technological ascent and encephalization over the past 2.4 million years demand a much earlier appearance of language, culture and modern cognition than permitted by the Eve model. The use of symbolic systems demonstrated by seafaring and palaeoart finds extends certainly several hundred millennia into the past, which deprives the Eve model of all plausibility, unless it accommodates a divergence time much earlier than that currently espoused. The same is demanded by applications of taphonomic logic, to any class of relevant evidence, and I regard this as particularly strong evidence that the African Eve advocates are greatly mistaken. Taphonomic logic should have precedence over any other form of archaeological reasoning (Bednarik 1994c).

Finally, the use of such sophisticated objects as beads and pendants in the Lower Palaeolithic demonstrates, beyond reasonable doubt, that its hominids possessed well-established semiotic systems of various types. In examining the origins of symbolism we would be well advised to abandon the traditional focus on the art of the Upper Palaeolithic of southwestern Europe. It played no decisive role in the advent of human symboling capacities, and it is probably not even relevant to the topic of symbolic origins. What is relevant to this topic are the products of symbolism that have survived

from the earliest phase of human culture, the Lower Palaeolithic. This evidence has so far hardly been considered, but has been neglected widely since its first tenuous mention 140 years ago. It is especially through this neglect, and through the frequent neglect of evidence not published in the English language, that the precarious models of recent years have been able to flourish as they did.

References

- Aitchison, J. (1996). *The seeds of speech: language origin and evolution*. Cambridge: Cambridge University Press.
- Allsworth-Jones, P. L. (1986). The Szeletian: main trends, recent results, and problems for resolution. In M. Day, R. Foley and Wu Rukang (eds), *The Pleistocene perspective*, 1-25. World Archaeological Congress, Southampton 1986. London: Allen and Unwin.
- Anderson, P. (1980). A microwear analysis of selected flint artifacts from the Mousterian of southwest France (abstract). *Lithic Technology* 9(2), 33.
- Anderson-Gerfaud, P. (1990). Aspects of behaviour in the Middle Palaeolithic: functional analysis of stone tools from southwest France. In P. Mellars (ed.), *The emergence of modern humans*, pp. 389-418. Ithaca: Cornell University Press.
- Arsuaga, J.-L., I. Martínez, A. Garcia, J.-M. Carretero and E. Carbonell (1993). Three new human skulls from the Sima de los Huesos Middle Pleisto-cene site in Sierra de Atapuerca, Spain. *Nature* 362, 534-537.
- Ayala, F. J. (1996). Response to Templeton. *Science* 272, 1363-1364.
- Bahn, P. G. (1987). Excavation of a Palaeolithic plank from Japan. *Nature* 329, 110.
- Barinaga, M. (1992). 'African Eve' backers beat a retreat. *Science* 255, 686-687.
- Bayer, J. (1929). Die Olschewakultur. *Eiszeit und Urgeschichte* 6, 83-100.
- Beaumont, P. (1992). The time depth of aesthetic and symbolic behaviour in southern Africa. Paper presented to the Biennial Conference of the Southern African Association of Archaeologists, Johannesburg.
- Bednarik, R. G. (1990). An Acheulian haematite pebble with striations. *Rock Art Research* 7, 75.
- Bednarik, R. G. (1991). An Acheulian cricket bat? *The Artefact* 14, 38.

- Bednarik, R. G. (1992a). Palaeoart and archaeological myths. *Cambridge Archaeological Journal* 2(1), 27-43.
- Bednarik, R. G. (1992b). Natural line markings on Palaeoli-thic objects. *Anthropologie* 30(3), 233-240.
- Bednarik, R. G. (1993a). Palaeolithic art in India. *Man and Environment* 18(2), 33-40.
- Bednarik, R. G. (1993b). About Palaeolithic ostrich eggshell in India. *Indo-Pacific Prehistory Association Bulletin* 13, 34-43

- Bednarik, R. G. (1994a). Art origins. *Anthropos* 89, 169-180.
- Bednarik, R. G. (1994b). The discrimination of rock mark-ings. *Rock Art Research* 11, 23-44.
- Bednarik, R. G. (1994c). A taphonomy of palaeoart. *Anti-quity* 68(258), 68-74.
- Bednarik, R. G. (1995a). Traces of cultural continuity in Middle and Upper Palaeolithic material evidence. *Origini* 18, 47-67.
- Bednarik, R. G. (1995b). Concept-mediated marking in the Lower Palaeolithic. *Current Anthropology* 36(4), 605-634.
  - Bednarik, R. G. (1995c). Untertag-Bergbau im Pleistozän. *Quartär* 45/46, 161-175.
  - Bednarik, R. G. (1995d). Towards a better understanding of the origins of body decoration. *Anthropologie* 33, 201-212.
- Bednarik, R. G. (1997a). The initial peopling of Wallacea and Sahul. *Anthropos* 92, 355-367.
- Bednarik, R. G. (1997b). The earliest evidence of ocean navigation. *International Journal of Nautical Archaeology* 26(3).
- Bednarik, R. G. (1997c). The origins of navigation and language. *The Arteface* 20, 16-56.
- Bednarik, R. G. (1997d). The role of Pleistocene beads in documenting hominid cognition. *Rock Art Research* 14, 27-41.
- Bednarik, R. G. (1998). The australopithecine cobble from Makapansgat, South Africa. *South African Archaeological Bulletin* 53, 4-8.
- Bednarik, R. G. (1999). Maritime navigation in the Lower and Middle Palaeolithic. *Comptes Rendus de l'Académie des Sciences Paris*, Earth and Planetary Sciences 328,

559-563.

- Bednarik, R. G. and You Yuzhu (1991). Palaeolithic art from China. Rock Art Research 8, 119-123.
- Belitzky, S., N. Goren-Inbar and E. Werker (1991). A Middle Pleistocene wooden plank with man-made polish. *Journal of Human Evolution* 20, 349-353.
- Beyries, S. (1988). Functional variability of lithic sets in the Middle Palaeolithic. In H. L. Dibble and A. Montet-White (eds), *Upper Pleistocene prehistory of western Eurasia*, 213-223. Monograph 54, University Museum, Philadelphia: University of Pennsylvania.
- Bickerton, D. (1990). *Language and species*. Chicago: University of Chicago Press.
- Bickerton, D. (1996). *Language and human behaviour*. London: UCL Press.
- Boas, F. (1888). *The Central Eskimo*, reprinted 1964. Lincoln: Univer-sity of Nebraska Press.
- Boëda, E., J. Connan, D. Dessort, S. Muhesen, N. Mercier, H. Valladas and N. Tisnérat (1996). Bitumen as a hafting material on Middle Palaeolithic arte-facts. *Nature* 380, 336-338.
- Bosinski, G. (1985). *Der Neanderthaler und seine Zeit*. Köln: Rheinland-Verlag GmbH.
- Brookfield, J. F. Y. (1997). Importance of ancestral DNA ages. *Nature* 388, 134.
- Chase, P. G. and H. L. Dibble (1987). Middle Paleolithic symbolism: a review of current evidence and interpreta-tions. *Journal of Anthropological Archaeology* 6, 263-296.
- Crémades, M. (1996). L'expression graphique au paléolithique inférieur et moyen: l'exemple de l'Abri Suard (La Chaise-de-Vouthon, Charente. *Bulletin de la Société Préhistorique Française* 93(4), 494-501.
- Davidson, I. (1997). The power of pictures. In M. W. Conkey, O. Soffer, D. Stratman and N. G. Jablonski (eds), *Beyond art: Plesitocene image and symbol*, pp. 125-159. San Francisco: California Academy of Sciences.

- Davidson, I. and W. Noble (1989). The archaeology of perception: Traces of depiction and language. *Current Anthropology* 30, 125-155.
- Davidson, I. and W. Noble (1990). Tools, humans and evolution: the relevance of the

Upper Palaeolithic. Paper presented to the symposium 'Tools, language and intelli-gence: evolutionary implications', Cascais, Portugal.

- Davidson, I. and W. Noble (1992). Why the first colonisa-tion of the Australian region is the earliest evidence of modern human behaviour. *Archaeology in Oceania* 27, 113-119.
- d'Errico, F. and P. Villa (1997). Holes and grooves: the contribution of microscopy and taphonomy to the problem of art origins. *Journal of Human Evolution* 33, 1-31.
- Dunbar, R. (1996). *Grooming, gossip and the evolution of language*. London: Faber and Faber.
- Gamble, C. (1994). *Timewalkers: the prehistory of global colonization*. Cambridge, Mass.: Harvard University Press.
- Goren-Inbar, N. (1986). A figurine from the Acheulian site of Berekhat Ram. *Mi'Tekufat Ha'Even* 19, 7-12.
- Goren-Inbar, N., Z. Lewy and M. E. Kislev (1991). The taphonomy of a bead-like fossil from the Acheulian of Gesher Benot Ya'aqov, Israel. *Rock Art Research* 8, 83-87.
- Gyllensten, U., D. Wharton, A. Josefsson and A. C. Wilson (1991). Paternal inheritance of mitochondrial DNA in mice. *Nature* 352: 255-257.
- Hayden, B. (1993). The cultural capacities of Neandertals: a review and re-evaluation. *Journal of Human Evolution* 24, 113-146.
- Howell, F. C. (1966). Observations on the earlier phases of the European Lower Paleolithic. *American Anthropologist* 68, 88-201.
- Howell, F. C. and L. G. Freeman (1982). Ambrona, an Early Stone Age site in the Spanish Meseta. *Anthroquest - L.S.B. Leakey Foundation News* 22, 11-13.
- Jacob-Friesen, K. H. (1956). Eiszeitliche Elefantenjäger in der Lüneburger Heide. *Jahrbuch des Römisch-Germani-schen Zentralmuseums Mainz* 3, 1-22.
- Keeley, L. H. (1977). The function of Paleolithic flint tools. *Scientific American* 237(5), 108-126.
- Kidd, K. K., J. R. Kidd, S. A. Pakstis, C. M. Tishkoff, C. M. Castiglione and G. Strugo (1996). Use of linkage disequilibrium to infer population histories. *American Journal of Physical Anthropology*, Supplement 22: 138.
- Kroeber, A. L. (1900). The Eskimo of Smith Sound. *Bulletin of the American Museum*

of Natural History 12, 265-327.

- Kumar, G., G. Narvare and R. K. Pancholi (1988). Engraved ostrich eggshell objects: new evidence of Upper Palaeolithic art in India. *Rock Art Research* 5, 43-53.
- Leroi-Gourhan, A. (1982). The archaeology of Lascaux Cave. *Scientific American* 246(6), 80-88.
- Mania, D. and U. Mania (1988). Deliberate engravings on bone artefacts of *Homo erectus*. *Rock Art Research* 5, 91-107.
- Mania, D. and V. Toepfer (1973). *Königsaue: Gliederung, Ökologie und mittelpaläolithische Funde der Letzten Eiszeit*. Berlin: VEB Deutscher Verlag der Wissenschaften.
- Maringer, J. and T. Verhoeven (1970). Die Steinarte-fakte aus der Stegodon-Fossilschicht von Mengeruda auf Flores, Indonesien. *Anthropos* 65, 229-247.

- Marshack, A. (1991). A reply to Davidson on Mania and Mania. *Rock Art Research* 8, 47-58.
- Marshack, A. (1997). The Berekhat Ram figurine: a late Acheulian carving from the Middle East. *Antiquity* 71, 327-337.
- Mottl, M. (1951). Die Repolust-Höhle bei Peggau (Steiermark) und ihre eiszeitlichen Bewohner. *Archaeologica Austriaca* 8, 1-78.
- Nadel, D., A. Danin, E. Werker, T. Schick, M. E. Kislev and K. Stewart (1994). 19,000-year-old twisted fibers from Ohalo II. *Current Anthropology* 35, 451-457.
- Nelson, E. W. (1899). The Eskimo about Bering Strait. In *Eighteenth Annual Report of the Bureau of American Eth-nology to the Secretary of the Smithsonian Institution, 1896-97*, Part I, 19-526.
- Noble, W. and I. Davidson (1996). *Human evolution, lan-guage and mind*. Cambridge: Cambridge University Press.
- Oakley, K. P. (1981). Emergence of higher thought, 3.0-0.2 ma B.P. *Philosophical Transactions of the Royal Society of London* B 292, 205-211.
- Pennisi, E. (1999). Genetic study shakes up Out of Africa Theory. *Science* 283, 1828.
- Peyrony, D. (1934). La Ferrassie. *Préhistoire* 3, 1-92.
- Prestwich, J. (1859). On the occurrence of flint-implements, associated with the remains of extinct mammalia, in undisturbed beds of a late geological period, *Proceedings of the Royal Society of London* 10, 50-59.

- Pringle, H. (1997). Ice Age communities may be earliest known net hunters. *Science* 277, 1203-1204.
- Roginsky, Ya. Ya., M. M. Gerasimov, S. N. Zamyatnin and A. A. Formozov (1954). Zaklyuche-nie po nakhodke iskopaemogo cheloveka v peshchernoi stoyanke Starosel'e bliz g. Bakhchisary. *Sovetskaya Etno-grafiya* 1954, 39-41.
- Sondaar, P. Y., G. D. van den Bergh, B. Mub-roto, F. Aziz, J. de Vos and U. L. Batu (1994). Middle Pleistocene faunal turnover and colonization of Flo-res (Indonesia) by Homo erectus. *Comptes Rendus de l'Académie des Sciences Paris* 319, 1255-1262.
- Strauss, E. (1999). Can mitochondrial clocks keep time? *Science* 283, 1435-1438.
- Svoboda, J. (1993). The complex origin of the Upper Paleolithic in the Czech and Slovak Republics. In H. Knecht, A. Pike-Tay and R. White (eds), *Before Lascaux: the complete record of the early Upper Paleolithic*, pp. 23-36. Boca Raton: CRC Press.
- Templeton, A. R. (1996). Gene lineages and human evolu-tion. *Science* 272, 1363.
- Thieme, H. (1995). Die altpaläolithischen Fundschichten Schöningen 12 (Reinsdorf-Interglazial). In H. Thieme und R. Maier (eds), *Archäologische Ausgrabungen im Braunkohlentagebau Schöningen, Landkreis Helmstedt*, pp. 62-72. Hannover: Verlag Hahnsche Buchhandlung.
- Tode, A. (1953). Einige archäologische Erkenntnisse aus der paläolithischen Freilandstation von Salzgitter-Lebenstedt. *Eiszeitalter und Gegenwart* 3, 192-215.
- Tromnau, G. (1983). Ein Mammutknochen-Faustkeil aus Rhede, Kreis Borken (Westfalen). *Archölogisches Korre-spondenzblatt* 13, 287-289.
- Valoch, K. (1987). The Early Palaeolithic site Stránská skála I near Brno (Czechoslovakia). *Anthropologie* 25, 125-142.
- Verhoeven, T. (1958). Pleistozäne Funde in Flores. *Anthro-pos* 53, 264-265.

- Vigilant, L., M. Stoneking, H. Harpending, K. Hawkes and A. C. Wilson (1991). African populations and the evolution of human mitochondrial DNA. *Science* 253, 1503-1507.
- Vishnyatsky, L. B. (1994). 'Running ahead of time' in the development of Palaeolithic industries. *Antiquity* 68, 134-140.
- Volman, T. (1984). Early prehistory of southern Africa. In R. Klein (ed.), *Southern*

African prehistory and palaeoen-vironments, pp. 169-220. Rotterdam: Balkema.

- Wagner, E. (1990). Ökonomie und Ökologie in den altpaläo-lithischen Travertinfundstellen von Bad Cannstatt. *Fundbe-richte aus Baden-Württemberg* 15, 1-15.
- Warner, C. and R. G. Bednarik (1996). Pleistocene knot-ting. In J. C. Turner and P. van de Griend (eds), *History and science of knots*, pp. 3-18. Singa-pore, World Scientific.
- Wendt, W. E. (1974). Art mobilier aus der Apollo 11 Grotte in Südwest-Afrika. *Acta Praehistorica et Archaeologica* 5, 1-42.
- Woodhouse, H. C. (1997). Ostrich eggshell beads in southern Africa. *Rock Art Research* 14, 41-43.
- Yakimov, V. P. (1980). New materials of skeletal remains of ancient peoples in the territory of the Soviet Union. In *Cur-rent argument on early man: report from a Nobel Sympo-sium*, pp. 152-169. Oxford: Pergamon Press.

Robert G. Bednarik (robertbednarik@hotmail.com) is the Editor and Permanent Convener of the International Federation of Rock Art Organizations (IFRAO); the founder, Editor and Secretary of the Australian Rock Art Research Association (AURA); and the Editor of the Archaeological and Anthropological Society of Victoria. He edits three scientific journals and a series of monographs. His several hundred articles and books include over 400 works in refereed scientific journals, and they have appeared in nine languages. He specializes in the origins of human constructs of reality, cognitive archaeology, rock art dating and microscopic studies, and he has conducted extensive fieldwork in all continents.

FIGURES

Figure 1. *Two ivory ring fragments, two perforated animal canines and a fossil shell with an artificial groove for attachment. Châtelperronian, Grotte du Renne, Arcy-sur-Cure, France. These objects were used, and almost certainly made, by Neanderthals.*

Figure 2. *Jasperite cobble from Makapansgat, South Africa, deposited in an australopithecine-bearing cave sediment almost three million years ago.*

Figure 3. *Pleistocene ostrich eggshell beads from India (a-c) and Libya (d-f). The three lower specimens are of the Acheulian.*

Figure 4. *Pendants from the Repolusthöhle in Austria, late Lower or early Middle Palaeolithic. Wolf incisor, perforated near its root, and flaked bone point.*

Figure 5. *Broken stone pebble pendant, drilled through the centre, from Shiyu wenhua, China. From the Middle/Upper Palaeolithic transition.*
