The dawn of exograms

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Abstract

Most of the differences between humans and other animals still endorsed in the 20th century have now been refuted. Even theory of mind, self-awareness, recursion and metarepresentation are losing their eminence as exclusively human variables. This may leave us with just one distinguishing trait: the talent of creating and using memory traces external to the brain. Palaeoart is the principal empirical evidence of this ability from the human past, a corpus that has been misconstrued in various respects. For instance, the discussion of the dawn of art-like productions and the behavioural range they facilitate has been consistently marred by humanistic banalities and lapses. Among the most damaging are to treat such productions as art or as symbols, and to impose commensurate but false taxonomies. Another fatal shortcoming of this debate has been the rejection of exogrammatic evidence on the basis that it is not art. This presentation endeavours to correct some of these misunderstandings.

Introduction

Throughout the 20th century there have been numerous efforts to define the differences between humans and other animals, practically all of which have been refuted by science, particularly ethology and neuroscience. Examples are 'upright walk', which of course has little to do with 'humanness'; or 'culture', which numerous species besides humans are known to engage in. Culture is merely an epidemic of mental representations (Sperber 1996). More to the point, 'culture' is simply a short-hand way of expressing that certain information states in one organism's brain cause, by mechanisms as yet unexplained, similar information states (or mental representations or 'memes') to be reconstructed in another brain. Humans are not passive receptacles filled by culture; these self-extracting systems cause them to create their own realities. Other proposed diagnostics for being human have included the possession of Theory of Mind, self-awareness and consciousness, all of which ethologists have found to be shared with numbers of non-human animals (Bednarik 2015a). Tool-making has often been cited, and yet it has long been known that numerous animal species are very adept in both making and using tools. Indeed, some local populations of chimpanzees have been recorded to use up to seventeen types of tools, possibly matching the earliest hominins in that respect. A favourite element of defining humanness has long been language or speech ability, but there are two problems with this demarcation expedient. First, it remains profoundly unknown at what point in hominin history this ability appeared first. For instance, the pronouncements of archaeologists and palaeoanthropologists of the language competence of 'Neanderthals' have ranged from that of an ape to that of an extant human. Genetics has recently shown that one of these extremes, and not some

'middle ground', is correct, which suggests that Pleistocene archaeology and palaeoanthropology are incapable of making such pronouncements. We do not tolerate statements from chemists that a given substance's pH is somewhere between 0 and 14, so if these two disciplines cannot provide much better resolution in their predictions, they need to be silent on interpretation. Second, communication systems are widespread not only among most other animals, but occur even among plants. In some non-human primates and other animals, including birds, they are almost as well developed as in extant humans. Therefore, language potential is not a defining faculty of humans. Nor is any other factor proposed in the last century, or before it.

Half a century ago, modern humans were defined as 'The Naked Ape' (Morris 1967). Recently, more sophisticated aphorisms have been suggested, such as 'the undiscovered primate' (Preuss 2000) or 'the neotenous ape' (Bednarik 2011a). In recent decades the search for elements separating extant humans from other animals has also become more refined, and practically all those diagnostic elements that had surfaced before the late 20th century have now been discredited or are acknowledged to be problematic in one sense or another. A new feature separating modern humans (*Homo sapiens sapiens* rather than 'anatomically modern humans', a glib but meaningless cliché) from other animals has gradually emerged since it was first proposed that early rock markings by hominins were externalised memory traces, similar to internal memory traces or engrams (Bednarik 1987). There are significant differences between brains that operate without them, and those that rely on them for additional storage. And there is no evidence that other animals are capable of creating or using exograms. It is this ability of consciously creating reality constructs through the skilled use of exograms that distinguishes us from all other creatures on this planet (Bednarik 2014a).

The ultimate purpose of this presentation is, however, to show that the search for the 'origins' of symbolling or art was always misguided, for various reasons. For instance, there is no evidence that any Pleistocene palaeoart should be described as 'art' in the sense of that modern, capitalist term: visual, auditory or performing creations by specialists called artists. The modern usage of the word 'art' is a historically recent development emanating from Europe and is probably not applicable to the art-like productions of both traditional societies and those of the distant past. Similarly, no evidence has been provided that art-like objects of the Pleistocene were necessarily symbolic productions. That is not to say that they were not, but it needs to be appreciated that the proof is lacking, just as it is impossible to test any interpretation of such phenomena. Any claim to know what palaeoart depicts is made outside of science as it is not falsifiable and derives from pareidolia, a necessary but problematic feature of the visual system (Bednarik 2016a).

More important in the present context are, however, the following considerations. Ever since the existence of Pleistocene palaeoart was accepted, after first being vehemently rejected by the archaeologists of the late 19th century, the phenomenon has been misunderstood, misinterpreted and misused. Not only is it wrong to define it as art; several other misunderstandings developed in the course of the 20th century. Palaeolithic art specialists acquired a set of beliefs exalting the great importance of this palaeoart. For instance, the Palaeolithic cave art of south-western Europe came to be seen as the beginnings of art and modern culture. The sites of its occurrence acquired the status of 'sanctuaries' and the authentication of these 'sacred' places became the prerogative of the Palaeolithic art experts, in much the same way as religious shrines are

validated in some religions, especially in Roman Catholicism: i.e. it is based on *authority* (Freeman 1994):

> Those special beliefs and feelings [about Palaeolithic art] are held by the professional prehistorian as well as the average citizen. Neither is particularly good at self analysis. ... There are reasons to believe that the behavior associated with the Palaeolithic sites is not directly modeled on that surrounding Christian shrines, but that these two manifestations of belief, reverence, and validation of experience have the same origin at a deeper structural level. I still can not pretend to understand that origin; I believe it to be promising material for further serious investigation (Freeman 1994, 341).

There are numerous examples, from Portugal, Spain, France, Italy, England, Hungary, Austria, Germany, Czech Republic, Romania and Russia (see Bahn and Vertut 1997), of rock art the high priesthood (Thompson 2014) of the Palaeolithic art lobby has falsely placed in the Pleistocene (Bednarik 2015b, 2016b). It demonstrates not only the inability of this priesthood to reliably determine the Pleistocene age of rock art; it also shows that the stylistic constructs it has created should be expected to be false, because the stylistic parameters determining them include so many errors. Especially in Spain there seems to be an epidemic of wrong Palaeolithic determinations of rock art that is in many cases only centuries old. The prime example of this trend is Siega Verde, a schistose site of petroglyphs on the Agueda river that has been demonstrated to be mostly of the early 20th century (Bednarik 2009), but which all commenting archaeologists placed in the Upper Palaeolithic.

Another factor is that many of these sites have been placed on UNESCO's World Heritage List on the pretext that they are of the Pleistocene and therefore of particular importance. Not a single one of the thousands of Pleistocene rock art sites from Africa, Asia, Australia or the Americas has ever been submitted to the UNESCO List. Moreover, it was never explained why a rock art site is of special importance when it is of the Ice Age, or why Holocene rock art should be less valued. It seems to reflect the priorities of Pleistocene archaeologists, but in this they ignored two factors: there is at least a hundred times as much Pleistocene rock art in the other continents as there is in Europe; and much of this extra-European rock art is older that the oldest reported in Europe. Ignoring these highly relevant factors, the Palaeolithic art lobby has been successful in securing World Heritage listing for dozens of European rock art sites that it attributes to the Palaeolithic. And yet many of them, such as Siega Verde in Spain or the many Côa sites in Portugal, are not even of the Ice Age, but are modern or sub-modern.

It appears that the reason for this obsession with 'Palaeolithicity' of rock art is a subconscious fantasy about European primacy in the development of modern human behaviour and culture: a subliminal belief that culture was 'invented in Europe'. The full inanity of this obsession becomes evident when we consider that:

1. The thousands of Pleistocene or early Holocene rock art sites of Australia (Bednarik 2010) are all of Mode 3 technocomplexes, which in Europe are called Middle Palaeolithic. In Tasmania, *all* rock art is necessarily of Mode 3 industries.

2. At hundreds of sites worldwide, rock art or portable palaeoart has been shown, or can reasonably be assumed, to be older than the Upper Palaeolithic or Mode 4 technocomplexes of Europe (Bednarik 2017).
3. The obsession with Palaeolithic 'art' is therefore Eurocentric, misguided and scientifically flawed.
4. The World Heritage List is not a credible reflection of empirical knowledge, but simply manifests cultural values held by European researchers. They seem to be genuinely unaware of the biased nature of their beliefs.
5. Concerning the gravity or perceived importance of the so-called Palaeolithic art of Europe it is worth remembering, in passing, that a significant portion of it was produced by children or teenagers, and no evidence has ever been provided that any major part of this corpus is the work of adults (Bednarik 2008a).

These factors (and others) suggest that the European obsession with Palaeolithic 'art' is based on a fundamental misunderstanding, as well as an inadequate knowledge of the relevant global empirical evidence. If we combine the logic of the importance of the 'Palaeolithic art' being tied to its age with the empirical fact that much earlier palaeoart occurs in other continents, we can resolve this misunderstanding with a formula of logic:

$$^{o}B_I = >A_I \because B_A = >A_A, \times C_A = >B_A, \acute{E}\ C_I = >A_I, B_I$$

in which $_I$ = importance, $_A$ = age, *A* = Holocene, *B* = Mode 4, and *C* = Modes 1 to 3 palaeoart. If and only if $_I$ of *B* is greater than $_I$ of *A* because $_A$ of *B* is greater than $_A$ of *A*, and if $_A$ of *C* is greater than $_A$ of *B*, then $_I$ of *C* must be greater than $_I$ of both *A* and *B*.

The nature of exograms

If the only really significant difference between humans and certain other animals is our extraordinary skill of creating and using memory traces stored external to the brain, i.e. exograms, it is fundamentally important to explore their occurrence in the early phases of hominin evolution. The only exograms that can reasonably be expected to have survived in any consequential numbers from those times are the evidence we collectively call 'palaeoart': art-like traces that may or may not be art in the modern sense of that term, that have somehow managed to survive on the archaeological record — and that also managed to be detected by archaeologists unschooled in the detection of exograms. It is therefore useful to begin this presentation by introducing the concept of exograms, and also attempt an explanation of why they are important.

The concept of the exogram derives from the engram, an entity first proposed to exist by Semon (1904, 1921: 24) and called 'mneme' by him. (The idea was reinvented by Richard Dawkins with his 'meme'.) An engram is a hypothetical memory trace, a persistent protoplasmic alteration of neural tissue thought to occur upon stimulation of the brain, and accounting for memory. The theory was that external sensory stimuli resulted in discrete biophysical or biochemical changes in neural tissue. An engram was seen as a cluster of neurons within the brain that stores a memory in neuronal connections. They work such that, under a sensory prompt from outside the brain or a conceptual prompt inside it, a certain grouping of neurons corresponding to a memory activates and recreates that memory. In the course of the 20th century, numerous

researchers tried to identify engrams in the brain tissue of various animals. For instance, Lashley spent several decades trying to locate engrams in rat brains (1923a, 1923b, 1924, 1930, 1932, 1935, 1943, 1950). Instead he succeeded in demonstrating that there is no single biological locus of memory, but that there are many (cf. Ogden and Richards 1956). Encouragement came from Penfield (1952, 1954) and others who reported reactivating memory traces by stimulating the temporal lobes. However, the reported episodes of recall occurred in less than 5% of subjects and could not be replicated by other neuroscientists (e.g. Jensen 2005). Subsequent work, such as that of Thompson (1967, 1986, 1990; Thompson et al. 1976), Steinmetz et al. (1987, 1991, 1992) and others confirmed the finding that the phenomena accounting for memory are widely distributed throughout the cerebral cortex.

However, the concept of the engram generated the idea of storage of memory traces external to the human brain. It was first proposed by Gregory (1970: 148). The notion of such a 'surrogate cortex', understood in principle already by Plato, was developed by Goody (1977) and Carruthers (1990, 1998; Carruthers and Ziolkowski 2002). We were the first to propose that archaic rock markings by hominins are externalised, engram-like forms to which the human intellect of the creator as well as beholding conspecifics could refer (Bednarik 1987). This concept of projections of neural structures perceptible to sensory equipment offered significant potential. In contrast to the neural structures, they are semi-permanent, are unconstrained and reformatable, can be of any medium, have virtually unlimited information capacity and size, and can be subjected to infinite iterative refinement. We emphasised that these engram-like phenomena would 'resonate' with the neural systems of observing hominins and our subsequent assessments of the cognitive development of hominins (Bednarik 1990a, 1992) derived from these insights (Bednarik 1987). We did not suggest a name for these phenomena; that was provided four years later by Donald (1991) when he coined the neologism 'exograms'.

Human culture as it developed over millions of years would have been unthinkable without such external memory traces; today what we define as 'culture' is largely based on them. The complexity of our cognitive systems would be inconceivable without the enormous mass of externally stored memory traces, be they memes, information units, numerals, written characters, insignia, artworks, clothing, symbolic entities, brand names, maps, dictionary entries, perceived meanings, belief systems and their manifestations, classification systems, emoticons, advertising jingles, street signs, time tables, slogans and a million other things eliciting detailed meanings in our brains. Exograms generate not only frames of reference; they can also create self-referential realities. As hominin competence in employing and exploiting exograms became the primary selecting factor in maximising cognitive fitness in our ancestors, these autocatalytic process gradually replaced natural selection criteria. This led to the creation of the constructs of reality we exist in, be it individually or collectively. Without these frames of reference, human cognition as we know it could not exist. Our realities exist because our imagined worlds became real, as Plotkin (2002) has demonstrated in his magisterial, authoritative work.

Without exograms we would have neither complex culture nor the ability of creating autopoietic realities. Indeed, without these external memory traces which act as external memory storage systems for our brains we would never have been able to cope neurally with the great cognitive load cultural complexity has foisted upon us as a species. They

explain the considerable, and growing, cognitive distance between our culture and that of other primates, seen on an evolutionary scale. In our own life times we are experiencing an acceleration of the impact of 'extended mind' developments, and a proliferation of exograms unprecedented in hominin history. Traditional employment of exograms now seems uncomplicated and easily defined.

Let us use the example of beads to illustrate the point. Beads are among the earliest exogrammatic artefacts known and they are still used today. Not only are they apparent indicators of self-awareness; they can potentially express a vast number of information messages about the wearer or the producer (Bednarik 1997a, 1997b, 2001, 2005, 2008b, 2015c). Beads can convey an endless number of ideas, depending on the cultural context, such as for instance status, marriageability, charms against any number of dangers, affiliation, personality, social standing. In some archaeological instances the roles of beads have been taken to great extremes, in terms of the efforts to make whatever point they were intended to make. Consider, for instance, the burials of the Streletsian site Sungir in Russia (Bader 1978). The three human burials of a technocomplex that was transitional between Middle and Upper Palaeolithic traditions contained 13,113 tiny ivory beads and over 250 perforated fox teeth. Thus, more beads than the number recovered from the *entire* rest of the Upper Palaeolithic of the world were found in a few square metres of this site (Bednarik 1995: 627). Whatever their message may have been, it can safely be assumed to have been a strong message, judging by the immense labour investment demonstrated. Of course we cannot know what that message was, but it does prove the great power of exograms tens of thousands of years ago.

The assumption that other primates, or other animals generally, seem to lack the skills of creating or using exograms provides one separation between humans and other animals that promises to stand the test of time. But it also immediately raises the question, when and how did exograms arise? The only exograms we can hope to recover from the Pleistocene period are the phenomena of palaeoart. They are therefore the principal corpus of evidence capable of illustrating how hominins divined their realities and how their imagined worlds became real. They are central to learning how our ancestors managed to create autopoietic reality from the sensory input the brain receives from the outside world and the proprioceptors. This would go a long way towards solving the greatest mystery in science. But instead of realising the profundity of palaeoart to comprehending the human condition (Bednarik 2011a), archaeology has relegated it to the humanistic banalities of 'art' or 'symbolisms', entities it is capable of comprehending. This explains nothing, but it gives rise to meaningless humanistic argument over whether something is or is not art. Moreover, it has resulted in an industry of creating false taxonomies, imagined styles and purported meanings, all of which are untestable, unfalsifiable and unscientific.

The earliest exograms

It is with the quest of finding the earliest exograms that yet another difficulty becomes apparent: because of the emphasis on 'art' and the effects of the false replacement hypothesis (i.e. the notion that all 'modern' humans descend from an 'African Eve'), the record of early palaeoart is severely distorted. This is simply because the African Eve hoax (Bednarik 2008c) totally rejects the possibility of any palaeoart or 'symbolic' production prior to this mythical Eve. Since this hypothesis

perceives the arrival of what it calls 'anatomically modern humans' in Europe as having occurred between 40 ka and 30 ka ago, and since it decrees that the previous robust humans were incapable of creating palaeoart, it has rejected any earlier such evidence for several decades. The only concession it is capable of making is that earlier palaeoart can exist in sub-Saharan Africa, Eve's Eden. Therefore, the Eve advocates have heavily promoted Middle Stone Age palaeoart from southern Africa, especially that of Blombos Cave, which is in the order of 80 ka to 70 ka old. But elsewhere, they have rejected such early finds, sought to refute them or their dating, and banned them from publication through their influence in the refereeing system. In these circumstances the 'high priests of the discipline' (Thompson 2014) have managed to censure information on most pre-40 ka BP palaeoart quite effectively, although they were never quite able to extinguish it entirely (e.g. Bednarik 1990a, 1992, 1995, 1997a, 1997b, 2001, 2005, 2008b, 2010, 2013a, 2013b, 2014b, 2015c, 2017). The existing record is therefore severely compromised and has been deliberately truncated by those controlling what is published prominently.

This means that as the replacement or African Eve lobby is losing its credibility, for instance with recent discoveries in human genetics, it is also losing its censuring control over reports and discussions of very early palaeoart finds. More new material is likely to emerge in the literature, and data that has been supressed or rejected by the Eve lobby can now be reconsidered. However, already the evidence of pre-Mode 4 palaeoart is impressive by any standard, comprising literally thousands of examples (Bednarik 2017). Certainly we have sufficient empirical evidence to attempt a preliminary consideration of the earliest use of exograms. In doing so we need to first shed the archaeological preoccupation with 'art' and 'symbolism', and replace it with the more sophisticated approach of the cognitive and neurosciences. Objects used or curated by hominins as external memory repositories are relatively easy to recognise, ranging from manuports (lacking any utilitarian function) to pigment use, from petroglyphs to proto-figurines, engravings and notches, to beads and pendants. Such finds simply have no conceivable practical purpose, but they tend to have exotic or visually arresting properties, or their potential of conveying coded information is manifestly evident.

Some of this evidence is hundreds of thousands of years old, and much palaeoart in the three Old World continents dates from Lower Palaeolithic technocomplexes (Bednarik 2017). What is perhaps most surprising is that a major component of this material is remarkably sophisticated. Consider, for instance, the phenomenon of cupules, which has been demonstrated to extend back hundreds of millennia at various sites in India and Africa (Bednarik 2008d). The detailed study of cupules at hundreds of sites in six continents, including replication experiments, suggests that the intent of the cupule makers was to penetrate as deeply as possible into the rock whilst maintaining the smallest possible diameter (Figure 1).

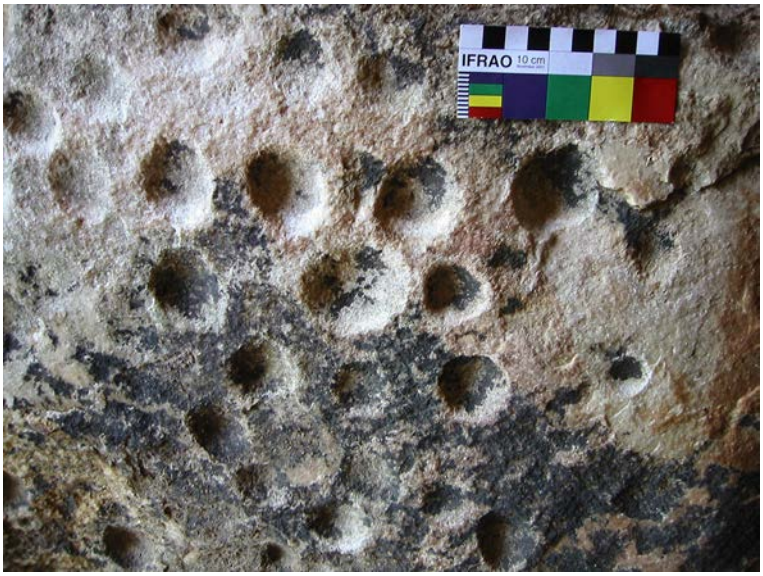

Figure 1. Cupules of the Lower Palaeolithic, Daraki-Chattan Cave, central India.

Similarly, the earliest known ostrich eggshell beads, of the Acheulian, are as perfectly shaped as possible and as small as technically feasible (Bednarik 1997c). Both examples indicate that part of the exogrammatic message they conveyed was the *idea of perfection*, which is also undeniably manifest in many of the handaxes of the Acheulian: large numbers of them are perfectly made but have remained unused; rather, they were meant to impress. Others were knapped to incorporate and display prominent fossil casts or large, gaping holes. This evident sense of technological excellence is itself an exogrammatic message that can safely be assumed to have been communicated among the makers and observers of such masterpieces. Moreover, some of these productions demanded very lengthy efforts and dedicated persistence to create and complete, which is not possible in the absence of a comprehensive anticipation of the finished product. Some of these exograms involved dozens of hours of dedicated and thoroughly planned labour. For instance, it has been established, by replication experiments, that to create a single cupule of average depth on unweathered quartzite requires between 50,000 and 100,000 strokes with hammerstones, and thus takes several days of dedicated work to make. The hominins producing the earliest known palaeoart, generally of *Homo erectus*, *H. antecessor*, *H. heidelbergensis* or *H. rhodesiensis* stock, were not devoid of advanced cognition and language, as averred by African Eve advocates for decades. The complexities of their behaviour could not have been significantly different from our own, only by degree and to the extent of the severe limitations imposed by their technologies.

The earliest known find suspected of representing an exogram is the Makapansgat jaspilite cobble, a manuport carried for many kilometres into a South African dolomite cave at some point in time between 2.4 and 2.9 million years ago (Eitzman 1958; Bednarik 1998). The cave's breccia is rich in australopithecine remains, but that does not prove that it was they who deposited the unmodified specimen; *Homo* species already existed in the region then (Figure 2). Manuports are known from the Lower Palaeolithic of Africa, Europe and Asia (Bednarik 2017). They include rock crystals and a variety of fossil casts (Figure 3). A particular variation of this phenomenon are natural

objects that have been modified by human hand to emphasise the specific iconic characteristics for which they were noticed and collected (Figure 4).

Figure 2. Jaspilite cobble from Makapansgat Cave, South Africa, manuport carried into the cave 2.4 to 2.9 million years ago.

Figure 3. Unmodified manuport from a Late Acheulian dwelling, Erfoud, Moroccan Sahara, strongly resembling a human penis.

Figure 4. Late Acheulian proto-figurine, modified, Berekhat Ram, Israel.

The use of pigment does not necessarily indicate the production of rock art or portable palaeoart; it can also signify the colouring of artefacts or the use of body paint. However, these still constitute the utilisation of exograms: covering the human body with red paint confers meaning, whatever that meaning may have been. Pigment use is well documented from Lower Palaeolithic times in all three continents then occupied. The earliest evidence seems to be from Mashwening 1 (c. 0.8 Ma old) and Kathu Pan 1 (c. 0.8–1.3 Ma old; McBrearty and Brooks 2000), both in central South Africa. Perhaps more secure is the dating of haematite fragments from the Acheulian of Major Units 6 and 7 of Excavation 1 in Wonderwerk Cave, which extends back to c. 1.1 Ma ago (Beaumont 1990, 2004, 2011). In India, too, haematite with work traces has been reported from Acheulian sites, such as Hunsgi (Bednarik 1990b). The Acheulian of Europe also yielded extensive traces of pigment use, including the 75 pieces of limonite from Terra Amata, France, c. 380 ka old (de Lumley 1966); a haematite fragment with striations at Beçov, Czech Republic (Marshack 1981); a rubbed haematite piece from Achenheim, France, about 250 ka old (Thévenin 1976); haematite remains excavated with lithics at Maastricht-Belvédère, Holland (Roebroeks et al. 2012); and the apparently shaped slab of ochre Howell (1966: 129) reported from the major Acheulian site of Ambrona in Spain.

Particularly useful in the study of very early exograms are beads and pendants. As already noted, their entirely non-utilitarian nature is undeniable, but in addition they also demonstrate the existence of self-awareness: body adornment is impossible without that cognitive facility. Self-awareness is also present in a variety of other animals, as apparently demonstrated by the mirror test (Keenan et al. 2003; for detailed discussions of self-awareness, Theory of Mind and consciousness see Bednarik 2011b, 2013c). Body adornment seems to be limited to humans, although one instance has been

reported in which chimpanzees may have engaged in incipient self-decoration behaviour (McGrew and Marchant 1998; McGrew 2004; Nishida et al. 2009). If that observation is correct, one might expect to find early examples of body decoration soon after the debut of *Homo*. But the earliest such evidence comes from Acheulian contexts and is in fact very much later. This can be readily explained by taphonomy: most forms of this evidence have no chance of surviving for the enormous timespans involved. Only with the introduction of stone beads did this phenomenon manage to endure in special circumstances and was also detected — only to be categorically rejected by the African Eve advocates because their dogma decrees that hominins of the Acheulian were far too primitive to use beads. In fact, it also dictates that no art-like productions were possible before Mode 4 technologies were introduced and before modern humans exterminated all other hominins.

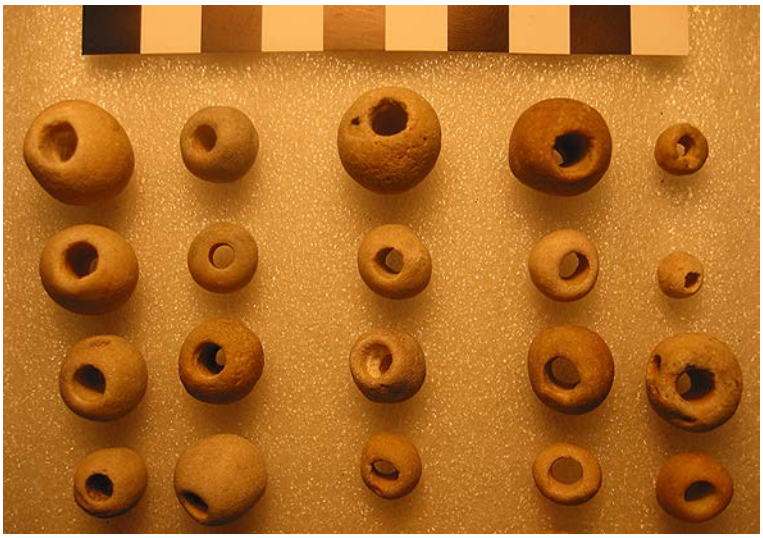

Figure 5. Acheulian stone beads from England and France, made from globular fossil casts of a sponge.

Well over 150 years ago Boucher de Perthes (1846) introduced Acheulian stone beads at the same time as he presented the novel idea that humans and Pleistocene fauna coexisted — vehemently rejected by all archaeologists. There are now many hundreds of these Acheulian beads held in English and French collections, 325 of which we have examined microscopically (Bednarik 2005; Figure 5). Their extensive abrasion wear where they had been in contact with other beads on strings as well as modification flaking found on some of them is ignored by the Eve advocates, as is the discovery of other Lower Palaeolithic beads or pendants. They include the crinoid fossil casts (Figure 6) from the Acheulian of Gesher Benot Ya'aqov in Israel, worn as beads (Goren-Inbar et al. 1991); the perforated items from the Repolust Cave in Austria (Mottl 1951; Figure 7), and the 43 ostrich eggshell beads from the Acheulian of El Greifa in the Libyan Sahara (Ziegert 1995; Bednarik 1997a; Figure 8). In this the Eve supporters demonstrate that they treat empirical evidence differently depending on its age: finds that contradict their model are rejected, whereas finds confirming it are accepted without standards of testing. For instance, rock art that postdates the appearance of their 'anatomically

modern humans' is readily admitted as Upper Palaeolithic 'art' (even when it is only a century old), but rock art predating that hypothetical event is rejected automatically.

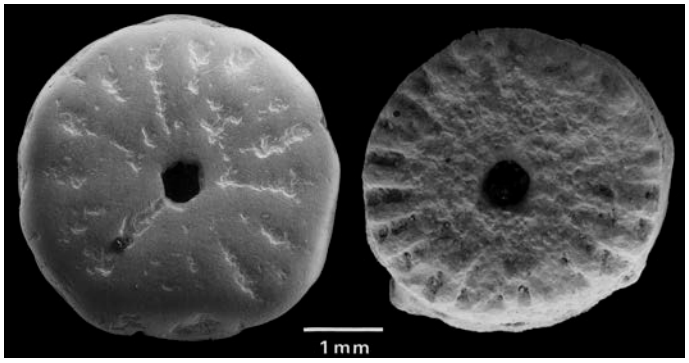

Figure 6. Segments of crinoid fossils from the Acheulian of Gesher Benot Ya'aqov, Israel, used as beads.

Figure 7. Perforated wolf's incisor, Lower Palaeolithic, Repolust Cave, Austria.

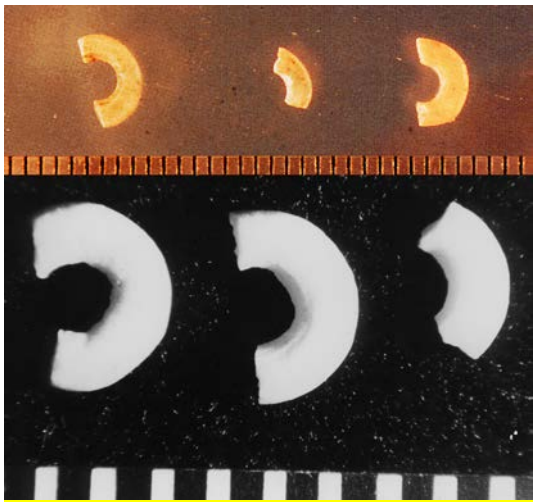

Figure 8. The first three ostrich eggshell beads found in the Late Acheulian of El Greifa, Libya, and replicas of them.

That also applies to rock art of Lower Palaeolithic technocomplexes. Prominent examples are the 200 ka old cupules on an fractured Nubian Sandstone slab excavated together with red and yellow ochre lumps at Sai Island in Sudan (Van Peer et al. 2003). The numerous cupules on fully metamorphosed quartzite at Potholes Hoek and Nchwaneng in the southern Kalahari, South Africa (Beaumont and Bednarik 2013, 2015) are estimated to be between 400 and 410 ka old (Figure 9). They belong to the Fauresmith tool tradition. Those of Auditorium Cave at Bhimbetka and in Daraki-Chattan Cave, both in central India, are thought to be even older, but remain effectively undated (Bednarik 1993; Bednarik et al. 2005). Twenty-eight cupules in Daraki-Chattan had exfoliated from the cave walls and were excavated in the floor sediment, where they occurred together with hammerstones used to create them as well as stone tools of a pre-Acheulian, Mode 1 tradition similar to the African Oldowan. The oldest known cupules of Europe, at La Ferrassie in France, are considerably more recent.

Figure 9. Fauresmith cupules on quartzite at Nchwaneng, Kalahari, South Africa.

Another class of exograms Lower Palaeolithic traditions have provided are engravings, be they on stone, bone, ivory or shell. Specimens include a series of engravings from the Holstein interglacial deposits of the Steinrinne near Bilzingsleben, Germany (Mania and Mania 1988; Bednarik 1995; Brühl 2018). The site used to be on the shore of a lake and has yielded many very robust hominin remains, besides a vast number of stone implements. The occupation evidence is between 300 and 400 ka old and some of the engraved bone fragments derive from the long-extinct forest elephant (Figure 10). Laser-microscopic study (Steguweit 1999) has demonstrated that the engravings are not incidental, but were made deliberately. A forest elephant vertebra found at Stránská skála, Czech Republic (Valoch 1987; Bednarik 1995), bears a series of evenly spaced, convergent engraved incisions that are probably also intentionally made. France has provided a further engraved bone fragment of the Lower Palaeolithic, from the Late Acheulian of Sainte Anne I, at Polignac, Haute-Loire (Raynal and Séguy 1986; cf. Crémades 1996). One of earliest known engravings was detected only recently in the material excavated by Eugene Dubois (1894) at Trinil, Java, from the very

stratum that yielded the first *Homo erectus* remains. The engraved pattern was found on a freshwater mussel shell stored in a museum collection and is dated to between 540 and 430 ka BP (Joordens et al. 2014).

Figure 10. Engraved fragment of a forest elephant bone, Lower Palaeolithic, Bilzingsleben, Germany.

A rock slab from Blind River Mouth, South Africa (Laidler 1933; 1934), bears a series of natural sedimentation lines that has been crossed at right angles by humanly incised or chipped lines, perhaps in reacting to the natural pattern. The age of the accompanying late assemblage has been estimated at between 270 and 540 ka (Beaumont and Vogel 2006; Porat et al. 2010). The earliest unequivocal engraved plaque from Africa comes again from Wonderwerk Cave (Figure 11) and has been dated to >276 ka BP (Beaumont and Vogel 2006). The stone plaque bears seven sub-parallel lines, which have been shown to have been made deliberately with stone tools (Bednarik and Beaumont 2012).

Figure 11. Engraved subparallel lines on stone slab, Wonderwerk Cave, South Africa, about 280,000 years old.

Thus the known number of exograms from Modes 1 and 2 contexts, perhaps in the order of 2000 specimens, is not very great — but still much too great to be simply ignored or swept under African Eve's red carpet. However, Eve's advocates also reject the possibility that Mode 3 (Middle Palaeolithic or Middle Stone Age) technocomplex traditions could yield palaeoart, and here their beliefs literally become absurdities. For instance, all of Australia's Pleistocene palaeoart, purportedly numbering millions of instances, are of Mode 3 rather than Mode 4 traditions. Even in Africa and Eurasia, the number of archaeologically known exograms attributable to people with Mode 3 technologies is considerable, amounting to many thousands of specimens. These have been listed and catalogued (Bednarik 2013a, 2013b, 2014b, 2014c, 2017) and the current state of knowledge suggests that there is no pattern of specific exogram types spreading out from specific centres. Some types occur first in Asia, others might first appear in Europe, some are first found in the Mediterranean region, while others can be first detected in sub-Saharan Africa. Figure 12 implies that there is no radial meta-geographical patterning of the evidence. Hence there is no support for the notion that palaeoart emerged first in any location, least of all in south-western Europe. We regard it as the task of Eve's lobby to refute each and every one of listed specimens before their absurd, genocidal hypothesis can be considered. Even a single accepted palaeoart example pre-dating the Upper Palaeolithic refutes their case.

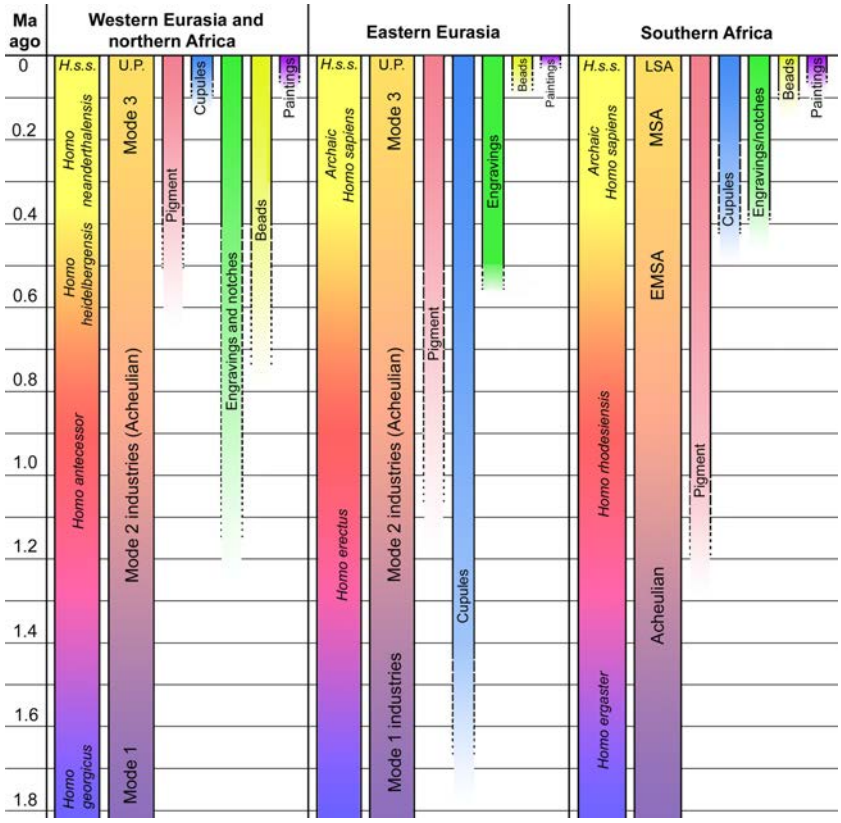

Figure 12. Comparison of hominin evolution and technology in three main regions, showing relative durations of the use of major palaeoart forms. No region can be regarded as the source area for the use of exograms.

The short list of Modes 1 and 2 palaeoart presented here provides the raw material from which to reason about the emerging hominin abilities to use exograms, to store memory traces outside the brain. Until now such a study has been effectively impossible, because of the religious adherence of Pleistocene archaeology and palaeoanthropology, two non-sciences, to a false model that completely dominated the discipline. We are not claiming that the status of each and every case listed on these pages is absolutely certain; there are no certainties in science. But if the study of the human past is to become a credible pursuit, each and every case needs to be tested by proper procedures, and not by a discredited dogma that derives from the hoax of Professor Reiner Protsch (Bednarik 2008c), explains nothing and lacks any empirical support.

Conclusion

To think of palaeoart as exograms, rather than as simplistic clichés such as art or symbols, requires a complete retooling of the brains of archaeologists. Rather than making rash assumptions about the meaning or purpose of the evidence, based on mediocre and ethnocentric reality constructs, it demands deeper contemplation of the generic cognitive functions of such phenomena. What were their roles in the evolution of hominin brains, what was it that caused them to eventually become agents of natural selection? Banalities fail to clarify, fail the cause and effect test, and cannot lead

anywhere but to confusion. The simplistic notion that palaeoart is art only leads to futile debates over what art is, or is not, which in a hermeneutic sense merely distract from the substantive issues.

In this case it is also self-defeating. The ultimate purpose of Pleistocene archaeology, palaeoanthropology and evolutionary studies of humans is to clarify how we became what we are today, and the most demanding aspect of this is to establish how human neural mechanisms created autopoietic reality from the sensory input the brain receives. It is this ability that defines humans. The use of simplistic and trite reality constructs to essentially explain away the crucial evidence of early exograms by mis-labelling it as 'art' or 'symbolism' is a travesty of scholarship. Archaeology's obsession with creating a teleological narrative of the 'human ascent' is an expression of an appalling self-glorification of a species derived from religion: our species is subliminally seen as the crown of evolution, as the teleological purpose of that process, 'created in the image of a deity'. Science, by contrast, regards evolution as totally dysteleological, as having no purpose whatsoever. It is a stochastic process driven by environmental changes. Moreover, our species has in reality been in genetic decline for tens of millennia (Bednarik 2008e, 2011a). The involvement of archaeology in the study of palaeoart has therefore retarded the discipline, and will continue to do so. To free palaeoart science from the obfuscations of archaeology is perfectly possible in the long term, but not in the short.

Let us be quite clear about this: more than one and a half centuries ago, a non-archaeologist presented two propositions: that humans co-existed with Pleistocene fauna; and that they produced beads (Boucher de Perthes 1846). He was totally opposed by archaeology for several decades, and the final denouncement came in 1858, when a French archaeology congress released the unanimous declaration that all of his Acheulian stone tools were "a worthless collection of randomly picked up pebbles" (Bednarik 2013d: 55). At that time, two geologists excavated alongside one of his trenches, testing his claims, which is precisely what good scientists do (Prestwich 1859). Their correction of archaeological ignorance made no difference, the discipline has continued its history of blunders ever since. The second testable proposition of Boucher de Perthes, of the use of stone beads in the Acheulian, was completely ignored. When we did finally test it 159 years later (Bednarik 2005), we found ourselves opposed by African Eve advocates, who knew with certainty that the primitive brutes of the Acheulian could have never used beads. The lessons from Neander valley, Altamira, Trinil, Piltdown, Glozel and hundreds of other monumental archaeological blunders seemed to have had no effect on the discipline. On the contrary, the magnitude of the errors appeared to increase with time: consider the recent African Eve hoax, the 'Hobbit' affair or the various face-offs with scientists over rock art dating. Pleistocene archaeology continues to flounder along its teleological course as if nothing had happened.

Not only did hominins of the Lower Palaeolithic technocomplexes use beads and pendants, they also made petroglyphs and protofigurines, they used haematite crayons and they made engravings. None of these phenomena has anything to do with art, but they are exograms. Primitive present-day hominins existing in their own simplistic worlds may see them as art, but a scientific frame of reference demands a considerably more sophisticated epistemological scaffold than traditional archaeology can possibly offer. It demands the involvement of the cognitive and neurosciences, and it necessitates

a completely different approach. After all, unless we clarify the origins of exograms we will not solve the greatest enigma in science: how the human brain creates realities.

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