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METAMORPHOLOGY: IN LIEU OF UNIFORMITARIANISM

Summary Since the advent of the discipline of archaeology, its underlying theory has been a particular brand of uniformitarianism: the idea that existing forces and patterns have applied uniformly in the past. This paper proposes the introduction of an alternative unified theory, one that lends itself to falsification and logical quantification. Metamorphology is explained by first reviewing the principles of taphonomic logic, and by then extrapolating them to illuminate the entire gap between the reality of what happened in prehistory, and the record of these events as they are perceived and interpreted by the individual archaeologist. Metamorphology is defined as a refutable, logic-based theoretical framework that is derived essentially from taphonomic logic. This paper considers some of the relevant theoretical issues.

INTRODUCTION

When we consider the beginnings of navigation we find that the earliest known evidence is the canoe from Pesse in Holland (Zeist 1957), and the paddles from Holmgaard in Denmark (McGrail 1991) and Star Carr in Britain (Clark 1971). All of these finds are between 8000 and 9500 years old; they are of the early Holocene. We do accept, however, that sea travel extends back at least 60,000 years, because we assume that the colonization of many islands off Europe and Asia as well as the continent of Australia was only possible with the use of sea-worthy watercraft (Kavvadias 1984; Birdsell 1977; Roberts et al. 1993). While there is no definite or falsifiable proof available of these much earlier sea journeys, we tend to accept that non-material evidence overrides the lack of material evidence in this instance. We do the same in

many other areas of archaeological knowledge, for instance, we assume that hominids had internal organs similar to ours, and hair, although no such remains have ever been found from the Pleistocene. I am not questioning the validity of such assumptions, or the basis of their induction, but I wish to examine some points of logic.

It is useful to consider that there appears to be a lag between the time when an archaeological phenomenon, such as navigation, occurred for the first time, and the time from which we can expect the earliest solid evidence for such a phenomenon. For instance in the case of watercraft we assume that for most of the duration of their use we have no direct evidence whatsoever. The systematic peopling of islands cannot have been the first use of watercraft. Boats and rafts must have been invented very much earlier, because it is not likely that hominids took to the open sea as

soon as they began using watercraft. So it is fairly certain that such equipment was first used over 100,000 years ago, which means that we have evidence from less than 10% of the phenomenon's real duration. I shall call the other 90% the taphonomic lag-time.

TAPHONOMY

It is of importance to any form of archaeological interpretation to consider the potential duration of this taphonomic lag-time for all classes of archaeological evidence. Let us look at a few specific examples. We have almost no remains of strings, ropes or thongs from the Pleistocene (the exceptions being the finds described by Leroi-Gourhan and Allain 1979; Nadel et al. 1994), and none at all of knotting technology which would be needed to render cordage technologically useful (Warner and Bednarik in press). Does this mean that knots and strings were not used? Of course not. In fact we have some indirect evidence, however sparse. A few of the supposedly female figurines of the Upper Palaeolithic seem to wear plaited or twisted cordage of some sort, especially specimens from Pavlov and Kostenki (Bednarik 1990; Marshack 1991). Hafting of stone tools with resin was certainly used by Neanderthals, and may have involved strings (Mania and Toepfer 1973; Shea 1988, 1990). More importantly, perforated objects were almost certainly used together with strings and knots, irrespective of whether they served decorative or utilitarian purposes. They, as well as certain other evidence I have listed elsewhere, suggest the use of strings and knots at least 300,000 years ago (Bednarik 1992a). Here, then, our taphonomic lag-time is well over 90%.

The oldest direct evidence we have of body decoration are the tattoos on the 'Iceman' from the Italian Neolithic, about 5300 years old (Barfield 1994). But again, we are fortunate

to have much older, indirect evidence. The body markings on figurines such as those from Mezin, or Kostenki Nos. 1, 2, 4, 8 and 24 may depict tattoos or body painting (Abramova 1962). But ochre has been used by hominids for hundreds of millennia, in Africa, Europe and Asia, and there is no reason to assume that none of it served for body painting (Bednarik 1994a). Again, there may be an enormous taphonomic lag-time applicable to the material evidence of the phenomenon (possibly over 99%).

The same applies to many other classes of phenomena, or types of materials. Dwellings, garments, basketry, indeed most forms of cultural as well as technological behaviour are extremely unlikely to survive from the Pleistocene. For well over 95% of the types of behaviour we could reasonably expect to have occurred in that period, we cannot anticipate finding any material evidence at all, be it direct or indirect. This applies more to cultural, especially symbolic evidence than to any other (Bednarik 1994b). The mere fact that we have managed to observe any symbolic evidence at all from the Pleistocene is most remarkable, and is in all cases we know of globally attributable to a combination of circumstances that can only be described as preservation flukes (Bednarik 1993a). For instance, a tiny proportion of the rock art of European Upper Palaeolithic people survived only because it was made in deep limestone caves of a particular lithology and past speleoclimate, where exceptional preservation conditions applied (Bednarik 1986). Rock art has been created for a few hundred thousand years (Bednarik 1993b), but only a fraction of a percent of all this Pleistocene production has survived. The same applies to portable art, most of which could survive only under unusually favourable conditions (Bednarik 1992b).

So far, I have created the impression that

taphonomic lag applies only to perishable evidence. This is not the case; all classes of archaeological material evidence are so affected. In no case can we expect actually to find the oldest instance of any class of evidence, not even the oldest gold object. Gold objects were often selectively deposited, in conspicuous locations, and are susceptible to discovery by subsequent peoples who might melt them down (as has happened). Even bronze hoards have been melted down as scrap metal. Or to cite a totally different selection process: archaeologists may think that most stone tools of the Pleistocene have survived. Not only is this just another fallacy (Bednarik 1980; Hiscock 1990), even if it were true, stone tool recovery is extremely selective, it is never random. For instance, we have no stone tools from the coastal peoples of most of the Pleistocene, because most of the land they may have occupied is now inundated by the sea. Our knowledge of Pleistocene economies is essentially one of inland economies, we know nothing about whaling, sealing, seabirding, fishing or scalloping, of boat use and any other technology used by coastal peoples of the Pleistocene. Our material evidence is entirely unreliable in terms of providing representative or random samples for any one period.

Moreover, pronouncements emphasizing the increased utilization of coastal environments in the Mesolithic are attributable to a taphonomic misunderstanding. The truth is that we have no balanced material evidence, no random samples, from any prehistoric period, and so the older the evidence in question is the greater is the taphonomic distortion. Most of this distortion is not random, but is systematic. By the time we reach the Lower Palaeolithic, taphonomic resolution becomes so coarse that the material evidence is practically worthless for deriving valid interpretations (Bednarik 1994b).

If we reviewed the archaeological record critically, we would find that over 99% of all archaeological phenomena have a chance of considerably less than 1% to survive in the Pleistocene record, and that this disparity still increases proportionally with age. No form of evidence is entirely exempt from taphonomic distortion, and no evidence can represent the oldest of its type. This is a fundamental truism which archaeologists consistently ignore. For the vast majority of evidence classes, the taphonomic lag-time is so high that archaeological interpretation of any distributional or compositional evidence, of any quantitative indices, is entirely worthless without first compensating for these potential distortions. To do this we need to develop a unified and quantifiable theory. But before proceeding with this task we have to consider yet another difficulty.

NON-TAPHONOMIC METAMORPHOLOGY

So far, we have considered mostly taphonomic distortion of the record. Taphonomy, I argue, accounts for only one part of the gap that must be accepted to exist between the reality of what happened in prehistory, and the record of it as perceived by the individual archaeologist. Even the concept of taphonomy itself has been misinterpreted and misused by archaeologists, who have consistently interpreted it as meaning *actuopalaeontology*, which is something quite different (Efremov 1940; Solomon 1990). But what should concern us more is that taphonomy is not the only factor to be considered here. Many others determining the archaeologist's perception refer to the subjectivity of archaeology itself, to the methods of recovery of evidence; those of its interpretation; those of its reporting and selective dissemination; those of its statistical treatment; the researcher's own biases and limitations, such

as limitations of knowledge or language (for instance, most archaeological data in the world have never been reported in the English language); and numerous complex other factors. These may include the priorities of research traditions, of individual leaders in the discipline, or of specific institutions, or of society as a whole. There can be no doubt that there is a very considerable gap between the reality of what happened in the distant past, and the abstraction of it as perceived by the archaeologist interpreting a specific, subjectively selected sample of the remaining evidence. To account for this gap, to decide what the distorting factors are and what their respective effects and interplay might be, we need a separate sub-discipline, and taphonomy is not the whole answer, because taphonomy accounts for only *some* of these truncating and modifying factors.

I propose that this discipline be called *metamorphology*, and that it be the scientific version of archaeology. For it to be scientific, its propositions must be refutable. It will be logic-based, but it must also draw heavily on knowledge of taphonomic processes, and on a variety of other falsifiable observations. A unified theory of metamorphology has already been formulated and published, at least in embryonic form (Bednarik 1993a, 1994b). It has been shown that metamorphological quantification, although extremely difficult, should be possible, at least in general or abstract forms (e.g. as integral functions).

With this theory it has been shown that archaeological concepts held about the beginnings of symbolism are substantially wrong, and this brings us back to the concept of taphonomic lag-time enunciated above. While it is widely accepted among archaeologists that such lag-times are significant for all other perishable evidence, in the case of evidence for symbolism it is widely held that the earliest 'common' evidence marks the first

appearance of symbolism. Taphonomic logic has shown this to be fundamentally false, and metamorphological investigation of the reasons for this mistake would provide a perfect case study for the massive bias archaeology has allowed to develop on this particular topic: it has even led to the rejection of evidence that did not seem to occur in 'large enough numbers', in the case of symbolism — an argument that seems logical to common sense, but is taphonomically quite illogical.

CONCLUSION

In the case of symbolic evidence, taphonomic variables involved seem comparatively straightforward and have already been defined, so by isolating them one might secure a good idea of the extent of non-taphonomic metamorphological influences. The latter are again particularly well known in the case of palaeoart, and some have already been investigated. For instance, we know much about the ignorance of archaeologists concerning existing data of palaeoart, how language barriers and other biases limited the flow of information in this field, or how false constructs about palaeoart beginnings flourished in archaeology and were widely accepted for a long time (Bednarik 1992a, 1993c, 1994b, 1995a, 1995b). It would be comparatively easy thus to establish consistent patterns of metamorphology from this evidence and tentatively to quantify them; once understood they can be applied to more complex areas of archaeology.

The result would be a unified theory of archaeology that could replace the traditional uniformitarianism archaeology has borrowed from geology, which is not falsifiable and thus not a scientific program (Cameron 1993, and RAR Comments therein). Theorems derived from uniformitarianism are not reliable: the contents of the lower of two sediment strata

are not necessarily the older, and charcoal particles contained in a stratum are not likely to be of the same age as the most recent placement of the contiguous sediment. Similarly, most of the archaeological propositions based on common sense are fallacies, e.g. those relating to co-occurrence of archaeological phenomena at favoured sites (Bednarik 1989), those based on stylistic definitions, those derived from statistical characteristics of archaeological taxonomies, or those using ethnographic (Huchet 1991) or replicative analogies. A great deal of archaeological theory and practice is non-scientific, and metamorphology offers an opportunity to replace traditional, ad hoc model building and

logic in archaeology with scientific forms of theorizing. Its initial main effect will be a significantly decreased level of confidence in archaeological model building and a facilitation of multiple interpretations and better resolution of probability ranges. In the long term, such approaches will lead to greatly enhanced rigour and refutability in archaeological interpretation.

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