

Darwinian Archaeology

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Some years ago, Richard Bradley noted that in archaeology, hunter-gatherers have ecological relationships with hazelnuts while farmers have social relationships with one another. The object of this paper is to suggest that we should indeed unite the treatment of the two, although not, as Bradley suggested, by including foragers in the social world but by including all of us in the ecological one. Today such an enterprise looks very different from when Eric Higgs first proposed it 30 years ago but in essence it is much the same: it involves the rejection of the usual belief in human uniqueness (which is to be seen as a hangover of the Judaeo-Christian tradition of the human soul) and the concomitant study of humans within the same framework as the rest of the living world. There is only one valid intellectual framework for understanding the living world: that of Darwinian evolution. Moreover, and paradoxically perhaps, we are far more likely to understand what makes humans, like all other species, unique, if we adopt the kind of inter-species comparative analysis which Darwinism makes possible, rather than by assuming (albeit no longer explicitly) that we are the goal towards which biological evolution was leading. The reluctance of many within the social sciences to embrace such a perspective makes it clear how far the Copernican revolution, which first displaced 'man' from the centre of the universe, still has to go.

What is the basis for the prevalence of Darwinian ideas in biology? It is certainly not an ideological commitment on the part of biologists to the early nineteenth century social and economic ideas which formed part of the background to Darwin's theory. On the contrary, it lies in the fact that the theory, and its synthesis with Mendelian genetics, have stimulated an enormously productive research programme, relevant to an extremely wide range of different biological issues, from genetic engineering to the significance of birdsong and the organisation of termite colonies. Moreover, its productiveness shows no sign of abating.

As far as archaeology is concerned, or at least the archaeology of the last 100,000 years, it is Darwinian evolution's claim to explain animal behaviour, including animal social behaviour, which is of central importance. If animal behaviour can be explained within this framework, why not human? The core of the explanatory framework lies in two key ideas. First, behaviour, including social behaviour, is part of the individual's 'extended phenotype' (Dawkins 1982); that is to say, how individuals behave is a function of their genes interacting with their environment and is something that is subject to natural selection. Second, the processes through which natural selection acts derive not just from such external factors as climate or from the perhaps predatory actions of other species, but at least as much, if not more so, from the actions of conspecifics. In this connection it is crucial to remember that selection does not just concern survival, which tends to be the standard archaeological assumption represented by processual archaeology, but also

reproduction and parenting. To the extent that variations in these activities are under genetic control and some variations lead to greater reproductive success than others, then changes in gene frequency will result.

If we find that this sort of approach leads to convincing explanations of the behaviour, including social behaviour, of other animals, why not humans? Animals, like humans, react to the relevant aspects of their perceived environment. Moreover, we certainly can no longer say that animal behaviour is based on 'instinct' while human behaviour is 'learned': learning is a key aspect of the developmental process of all complex animals and its significance is that it provides a means of flexible response to situations. By and large these responses will not be passed on to future generations. However, to the extent that new situations lead to new behaviours which affect gene frequencies, increasing or decreasing the probability of engaging in the new behaviour pattern, then biological evolution will occur. In this case, Darwinian theory provides us with a basis for assessing the costs and benefits in selection terms to the individuals involved and for showing how these relate to the outcome of particular kinds of event, whether interactions between parents and offspring, between male and/or female conspecifics, or between predators and prey.

The key difference between humans and other animals from an evolutionary point of view is that humans have a second inheritance system, independent of the genes, the mechanism of cultural transmission. This is also possessed by some other animals to some degree although only in humans has it come to be of major significance. However, precisely because it is an inheritance system, cultural transmission is in many ways analogous to genetic transmission. Moreover, by comparing the two, both the positive and negative analogies between them can be spelt out and their implications considered; thus, for example, while genetic inheritance derives equally from two parents, it is possible for people to have an enormous range of 'cultural parents', whose attributes or actions they imitate, including people younger than themselves. Furthermore, in the same way that a considerable body of theory has been developed to explore the implications of genetic transmission, for example at population level, so too can a comparable body of theory be developed to explore the implications of the specific properties of cultural transmission, an endeavour which has now been going on for over twenty years (see *e.g.* Cavalli-Sforza and Feldman 1981; Boyd and Richerson 1985).

On this view, we have to take into account both genetic and cultural transmission if we are to understand human behaviour and culture and their evolution. Approaches that do this are known as *dual inheritance models*. They start from the point of view that culture cannot be left out of account because it represents a transmission mechanism that can lead to outcomes different from those predicted by genetic transmission, with its currency of reproductive success. On the other hand, built-in human propensities and their influence on the calculus of costs and benefits during individual decision-making cannot be neglected either. Such an approach tries as far as possible not to make any advance commitment as to what are the significant factors operating in any particular case but to leave them open to empirical determination.

What are the advantages of adopting such a perspective for archaeology? The most important answer to this question is that it provides a single over-arching framework which links many different areas of archaeology that are usually pursued entirely separately from one another, with very little contact between their practitioners, some of whom see themselves as economic or environmental archaeologists, others as social archaeologists and others still, as culture historians. Nor is it a matter of other aspects of archaeology giving primacy to, or being subsumed by, 'environmental' or 'economic' archaeology, which are the areas usually associated with a Darwinian evolutionary approach given their concern with environmental adaptation. On the contrary, the vast majority of 'adaptationist' archaeology suffers from two major problems. It is based on the functionalist group-selection models discredited in biology by authors such as William Hamilton and John Maynard-Smith in the 1960s, and it assumes that the environment determines rather than selects. What it actually acts on is the current state of a phylogeny - the outcome of a process of descent with modification which, in the case of humans, is both biological and cultural; thus the current cultural state is highly relevant to the process of adaptation, and the previous history of subsistence practices, for example, is just as important in understanding them as current environments. In fact, there is likely to be a variety of reasonable solutions (local optima) to an adaptive problem and the one that a given population arrives at is likely to depend on the specifics of its previous history. Evolutionary outcomes are the result of *bricolage*, not ground-up *de novo* optimal design. Moreover, substantive optimality, which is often criticised as an invalid assumption of evolutionary approaches, is not an issue, although assuming optimality in a particular context can be a useful heuristic. All that matters is success in relation to existing alternatives, which will themselves be changing. The Red Queen is the relevant analogy, as many authors have pointed out (e.g. Ridley 1994).

So, if the unifying framework for archaeology doesn't come from adaptation, where does it come from? The answer is from a focus on generic processes of individual decision-making, the perceived costs and benefits which derive from them, and their consequences (intended and unintended) for what is genetically and (especially) culturally transmitted through time; the latter are potentially available to us in the archaeological record. This is not an anachronistic and ethnocentric claim that people are universally culturally constructed as modern western individuals are; it is simply applying to humans the same approach as modern evolutionary theory applies to animals: it is through the interaction of individual organisms that evolution takes place. If they are humans then how they are culturally constructed is one of their attributes and the reasons for it will be an object of interest.

What individuals perceive as costs and benefits depends in turn on what has previously been transmitted to them, both genetically and culturally; this will define their preference structure in a given situation. Generally, people act without a conscious awareness of their preference structure: they unthinkingly do what seems natural. However, at least on the cultural side, innovation is always a possible outcome.

Since survival and reproductive success have been central to the whole of the evolution of life, so that all living things have genetically-determined mechanisms which under normal conditions lead to behaviour which favours those goals, it seems likely that humans have the same genetically inherited propensities which affect their preference structures and thus their decisions. To the extent that selection has acted to produce not just a propensity to achieve reproductive success but, further, to favour different strategies for achieving it by males and females, then male and female humans too may have different inherited preference structures in this respect, as a legacy of history. Thus, what a male perceives as the best course of action in a particular context may not be the same as a female, even if both share the same (non-discursive) goal. However, contexts change and balances of costs and benefits change with them; preference structures and courses of action that may have led to the best choices in the past, for example in achieving reproductive success, will not necessarily do so in the future. Indeed, this is the essence of selection. To suggest that the past legislates for the future in such situations is rather like saying that there is some rule that a particular population of plants or animals may not respond to changing conditions.

As noted above, archaeologists who claim an interest in evolutionary approaches have paid far more attention to survival than to the issue of reproductive success, which in fact depends on social interactions, among men, among women and between the two, interactions that are clearly influenced by differential power relations. Investigation of these issues is central to a Darwinian archaeology, just as much as the study of subsistence; indeed, it is the Darwinian framework that provides the theoretical basis for linking the two together. However, the examination of sex and gender issues in archaeology from such a perspective has barely begun.

On the other hand, in humans the key inheritance mechanism is cultural transmission. As noted above, this too can be studied by a Darwinian approach, which looks at the effect not just of such processes as selection and drift, but also at the transmission process itself. As Cavalli-Sforza and Feldman (1981) have shown, because there are many mechanisms of cultural inheritance other than 50:50 biparental transmission, it is possible, *for reasons arising from this fact alone*, for cultural traits to spread in a population which are actually deleterious to genetic transmission; the practice of celibacy is an obvious example.

As archaeologists, we are in a better position than anyone to trace the outcome of processes of cultural transmission and the complex factors which affect it in particular ways in specific cases. We can trace the history of subsistence practices through time, the changing frequencies of axe forms, shifts in ways in which pottery is decorated, or changes in social patterns. These cultural lineages, as we may call them, are analogous to genetic lineages, subject to mutation and replicated through time with changing frequencies arising from the actions and decisions of their inheritors, who have only partial control over them: the fact that you can't choose your biological parents generally has both cultural and genetic consequences.

The kind of archaeology required to address these issues does not involve pre-judging the relevant factors and putting them into categories, such as 'social', 'economic' or 'cultural' archaeology. It requires us to specify the micro-scale processes operating in a particular case and their population level consequences. Indeed, the accusation we can level against processual archaeology is that it was never processual enough. Let us take, as a hypothetical example of what I have in mind, some of the possible explanations for an observed decrease in frequency of a particular type of pottery decoration in a site or region. One is that it is a neutral trait, subject to the vagaries of cultural drift (cf. Neiman 1995). Another is that the population of pottery makers is declining as part of a general population decline, perhaps associated with deleterious climatic change. A third is that the residential pattern which links experienced potters to those who are learning becomes disrupted. A fourth is that it is found on a functional vessel type which is becoming redundant, whether because of technological innovations or changes in social practice. A fifth is that it was originally taken up because it was prestigious, perhaps an innovation of the highest-ranked woman in the community, but is now being replaced by a different newly prestigious alternative. A sixth is that it is now being perceived as an identity marker of another group with whom one is in conflict over some important resource. Clearly, the list could go on and on but the processes involved are closely analogous to genetic ones: drift, selection (cultural rather than natural) and linkage (dependence on other things affected by natural or cultural selection). Furthermore, the result is the outcome of events at the individual level, but over which the individual may or may not have some control. Equally important is the fact that the processes concerned are, in principle, amenable to archaeological investigation.

However, this last point usefully brings us on to the final, profoundly practical aspect of a Darwinian approach to archaeology which I want to address here. Archaeological approaches to artefactual variation have generally been typological and essentialist: everything is divided into types, which are uniform categories: a vessel is a Bell Beaker, for example, or it isn't. This sort of approach is completely inimical to the adoption of a Darwinian perspective, which is based on the view that it is variation within populations, differentially transmitted through time for the sorts of reasons just illustrated, which is the key to understanding change. Defining such variation out of existence is normally our very first step in analysing our data! Obviously we are going to have to do something about this if the Darwinian programme is to be realised.

Conclusion

Archaeology has a great deal to gain by embracing a Darwinian approach, not least in the breaking down of intra-disciplinary boundaries, but to realise those benefits some major changes in disciplinary practice will be needed, not to mention the inclusion of evolutionary theory as well as social theory in archaeological education: Maynard-Smith needs to be there along with Levi-Strauss, and Dawkins with Derrida. Our current understanding of what it means for humans to be a part of nature may be very different from that imagined 30 years ago by Eric Higgs but,

nonetheless, it is based on sounder evolutionary foundations and has the potential to give us a research programme as powerful and productive as that which has driven biology.

References

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