

ARCHAEOLOGY AND THE SCIENCE OF THE CONCRETE

by

Mary HESSE

THE METHODOLOGICAL DEBATE

Like most of the human sciences, archaeology has passed in the last few decades through most of the phases of methodological debate that have characterized the natural sciences. There was a positivist and descriptive phase in the mid-20th century, which rejected earlier speculative and romantic tales of migrations, invasions and diffusions of culture having little conceptual or historical basis. Archaeology understood itself as what can be dug up and the immediate inferences therefrom. With the more sophisticated hypothetico-deductive method delineated in the mid-century for natural science (by Popper, Hempel, Nagel), the so-called "New Archaeology" of the 1960's and '70's came to take a more relaxed view of the possibility of theories about the unobservable, so long as deductions from these could be empirically tested. In consequence, systematic, theory-led collections of test-data flourished. Statistical methods were ingeniously exploited to test hypotheses by means of apparently non-random distributions of objects, properties, and spatial and temporal arrangements. Such statistical studies often re-worked old data and derived illuminating new correlations.

The 1960's and '70' were, however, also the period in which philosophers of the natural sciences were coming to realise that empirical data are not simply given, but are theory-laden, that is, collected and interpreted in the light of some theoretical framework or other, and that if this is true in the natural sciences, it is true a fortiori in the human sciences. The process of observation-theory-prediction-test is circular, not linear; change of theoretical framework can lead to rejection of previously interpreted observations as well as observations leading to rejection of theory. Since archaeology is a human science, its data are always laden with interpretations involving human intentionality – flint flakes are related to tool-using, ditches to draining or defence, holes to foundations of buildings. Archaeology is also a historical science, and as in history it is misleading to expect rigorous law-like correlations between types of human action and its social and natural environment. Inference typically takes place not to laws but to theories about the particular causes and antecedents of particular events, and takes place partly by analogy from similarities and differences between particular cases.

So far the methodological debate has followed the same lines as that common to all the human, or hermeneutic, sciences. But archaeology has the special feature that its theories must be about unobservable events that are inaccessible in time, and about social relations and mental beliefs that are inaccessible from mere material non-literate remains. Thus the methodology of

inference from analogy with more accessible societies, whether documented or ethnographically describable, becomes crucial, and the problems of analogical inference become fundamental problems for all philosophy of archaeology. There is an added difficulty, shared by archaeology with the anthropology of extant societies, but to a greater degree. This is the problem of the dichotomy between so-called traditional or symbolic thought-forms, and the scientific rationalizing presuppositions of western thought, including of course the study of archaeology and anthropology themselves. To understand and reproduce the symbol-systems pervading non-western cultures that can be visited is a hard enough task ; to discover it for societies distant in time is so daunting that positivist exclusion of any such attempt from a scientific archaeology might seem to follow necessarily.

The problem is this : how to infer from material remains and their natural environments to the socio-cultural features of the peoples who left them, a problem exacerbated by the fact that everything we know about prehistory and pre-literate peoples tells us that their conceptions of themselves and their societies were structurally very different from ours. How, in other words, do we infer from things to symbols and what they symbolize ?

SYMBOLIC AND STRUCTURAL ARCHAEOLOGY

It may be well to begin with some examples of studies which explicitly address this question. A model investigation of this kind (Von Gernet & Timmins 1987) concerns a discovery in a Canadian Iroquois grave of the 12th century AD of two significant items : some bones of the Carolina parakeet, which had never been found alive north of the Great Lakes and is now extinct, and the stone bowl of a pipe. The context suggested the association was not fortuitous, and the author traces similar associations between birds and pipe-smoking through ever-widening circles of analogy and generalization, including 17th century literary and artefact evidence of pipes ornamented by bird skins and bird engravings, the Indian peace-pipe ritual, the smoking of entheogens (mind-altering plants), analogous modern Indian collections of significant artefacts, to the bird effigies and symbolisms associated with North American and Asian shamanism. Thus the original find of grave goods is put into a context of meanings linking time and space, within which it is interpreted as an indication of a form of symbolism in the 12th century, 500 years earlier than previous evidence had suggested for North America. Moreover, the investigation suggests that such bird/smoking symbolisms do not have to be spontaneously generated or diffused by cultural contact, but may reflect very ancient substrata of belief which persist in varying manifestations, depending on specific environments. The hypothesis is both suggested by and supports the data by interpretation and coherence. It is doubtless not the only hypothesis that could be suggested, but in this respect it is not different in principle from hypotheses in natural science, where theories are likewise underdetermined by data, and data are theory-laden.

Two other features of symbolism are suggested by analogical inference and can be illustrated by examples. The first is the hypothesis that symbolism is not a direct one-to-one relation between symbol and social meaning, but has a more complex transformational relation to the social structure. This may be illustrated by a study of Neolithic mortuary practice in England and south-eastern Sweden (Shanks & Tilley, 1982). The bones in barrows are not distributed as complete skeletons, but in non-random piles of different types : skulls, ribs, vertebrae, limbs, etc. Piles of different types are separated by definite boundaries marked by pots or skulls. The

arrangement suggests an emphasis on the collective rather than the individual. On the other hand there are signs of differentiation between individuals, in that adult and child remains and male and female are sometimes separated, in apparent contradiction with the other type-classification. Cross-classifications of this kind are very familiar in social categorization, and may be taken to indicate some degree of contradiction between different manifestations of social order. In recent Marxist-inspired analyses the "contradictions" have been identified with those between social classes, elites, subject-people etc., but there is no need to restrict the idea to class-contradictions; kinship, trade, clan and other differences may provide equally illuminating hypotheses.

Tensions between cross-cutting differences may be represented in a symbol-system which serves to facilitate communication between groups, to reproduce existing social order and to legitimate it by attempting to mediate contradictions, and also to bring into consciousness latent conflict and hence to initiate social change. The authors of the Neolithic mortuary study follow Bourdieu in concluding that "The natural and social world must appear to be self-evident. As we have seen, ritual activities by their very nature are one of the most effective means of carrying this out. Such activities serve to lay down a clear dividing line between the thinkable (the present social order) and the unthinkable (some other social order)." (Shanks & Tilley 1982 : 151).

The same example may serve to illustrate another problematic feature of the relation of the symbolic to the social. There is the difficulty for western thought of conceiving the connection between apparently arbitrary symbols and rituals and the social order of which they form part. As just pointed out, this is not a question of trying to "decode" symbols piecemeal into their "social meanings", but it does involve postulating some non-arbitrary relationships, however complex, between symbolic beliefs and actions and the (to us) more familiar world of family, production, economic exchange, and institutions of power. In the present example, correlations and ancillary evidence may suggest that piles of sorted and differentiated bones have an intrinsic relation to collective solidarity, but it is difficult for us to *think* the inwardness of such a relation. Similarly, pot-decoration (which is fairly accessible to archaeologists) has frequently been used to show how social boundaries and conflicts (which are not directly accessible) are represented, mediated or concealed. It is rarely the case that our dissociated aesthetic sensibilities can think complex connections between decoration and social structure; in other words, *verstehen* does not help us there as in many other areas of human intentionality. Hypotheses relating symbols to society have therefore to rest largely on correlation, analogy and circumstantial evidence across comparable societies.

As a form of scientific inference, analogy has traditionally been regarded as a frail and distant kinsman of inductive and deductive methods. There are, however, now signs of its rehabilitation within logic, philosophy of science and philosophical anthropology. In the next part of this paper I shall outline two of the developments that are particularly relevant to archaeological method. Firstly there is recognition of traditional thought as the so-called "science of the concrete", and secondly there are new justifications of analogical inference within scientific method in general.

THE SCIENCE OF THE CONCRETE

Levi-Strauss begins his classic work *La Pensée Sauvage* by distinguishing between the logic and science of the *concrete* and that of the *abstract*. He makes it clear that in his view this is not a fundamental distinction between “traditional” and “advanced” societies, but is a discrimination that necessarily pervades all languages and cultures. All thought demands order, initially in the form of classifications : “Any classification is superior to chaos... even a heterogeneous and arbitrary classification preserves the richness and diversity of the collection of facts it makes. The decision that everything must be taken account of facilitates the creation of a ‘memory bank’ ” (Levi-Strauss 1966 : 16).

The science of the concrete classifies by means of immediate sensory qualities, by similarities and differences, by analogies of property and structure, and expresses abstract ideas by symbols drawn from the concrete. For example, early plant taxonomies emphasized obvious characteristics such as flower colour or medicinal qualities which gathered plants into groups, facilitated the recognition of herbal remedies, and provided a language of flowers as symbolic of the human passions. The science of the abstract, on the other hand, classifies by means of contiguities and causes rather than directly observable similarities and differences, that is it is metonymic rather than metaphoric, and it generates abstract theoretical structures from which a technical language and mathematical explanations may be developed. Plants are then classified by deeper characteristics not always directly observable, so that simple comprehensive taxonomies can be derived and related to objective features of plant evolution or inter-species fertility. The purpose of the classification is related to what can be done with nature (instrumental science), rather than what can be seen in nature or constructed out of it for the purposes of ordering social life. The language of flowers and all such metaphorical extravagances are discarded in the science of the abstract.

This, however, is to express the contrast much too sharply and from the point of view of “our” science, which positivist interpretations have regarded as superceding the science of the concrete because it is alleged to be the unique route to objectivity about what “really is” in nature. This propensity to relegate the science of the concrete to traditional thought in comparison with modern science can be challenged on two fronts. First, as Levi-Strauss himself emphasizes, all peoples of whom we have knowledge, from the Paleolithic on, show evidence of using induction, hypothesis and testing on the basis of their classifications in the interests of exploitation of the environment. If logical thinking is constituted by the mind’s ability to model the world, their capacity was often greater than ours. For example, questions about potential marriage-partners elicit immediate response, even though the highly complex kinship structures on which marriage rules are based often defeat the anthropologist’s attempts to make them explicit. There is evidence from similar circumstances in modern non-western cultures that, when asked, appropriate rules can be produced, but only to satisfy the slow mental processes of the anthropologist. Non-literate societies, in fact, need to be able to manipulate as many complex mental models as we do.

Secondly, the concept of a symbol system needs to be re-examined. Traditional semiotics sees it as a kind of *code*, in which signs, whether objects, words or actions, are taken to *stand for* something else which is their *meaning*. Such a theory suggests that symbolic systems can simply be decoded piecemeal into their meanings, in much the same way as the discredited Fido-

fido theory of word-meaning held that words stand atomistically for their referents. Even currently acceptable theories of language that depend on correspondence or satisfaction-meaning are bad models for symbolism, because they still imply a relation of "standing for" states of affairs that would make utterances true, although the units of language are now sentences and not words. These theories are still literalist, that is they introduce the additional elements of "truth", which is problematic in the case of symbolism, because if symbolism is not reducible to "literal" concepts, it is not clear how judgments about its truth can arise.

Pointing out that symbolism is not like this has led some to suggest that it is not a language at all, but this does not follow. A better model for the special features of symbolism is based on a more adequate non-correspondence theory of language. Such a model is implicit in many of the metaphors of recent archaeological writing, notably in Ian Hodder's *Reading the Past*. Hodder treats data as *text* to be read ; all texts presuppose some *rules* of connection which it is the archaeologist's task to uncover ; the interpretation of all texts depends on *context* ; and most importantly the metaphor of *meaning* applies to both texts and objects ; "the meaning of an object is derived from the totality of its similarities and differences, associations and contrasts" (Hodder 1986 : 138). I have argued elsewhere (Hesse 1988a, 1988b), in relation to linguistic metaphor, that linguistic meanings are not univocal and should not be understood in terms of a relation of "standing for", but in terms of *meaning relations* such as synonymy and heteronymy, structural analogy and inversion, inclusion and contradiction. In this perspective words are like symbols (sometimes they *are* symbols), and ultimately the meaning relations in both types of system rest on perceived similarities and differences between objects, properties and contexts. Symbolism may lack syntactic and semantic rules of the kind studied in linguistics, nevertheless use of symbols is rule-governed, and since symbols and words have a similar semantic basis, symbolism may be said to be a primitive language. The crucial respect in which such a theory differs from standard linguistics is that it is *contextual and dynamic* ; in neither symbolism nor natural language does it make sense in general to ask of isolated objects, processes, actions, words, sentences, or even whole texts "*hat* does it mean ?", where "meaning" is taken to be something outside the context of use. Just as a poem's meaning is a function of its internal organization, which gains significance from a multiplicity of inexpressible resonances in the world and human experience, so it is with symbolism.

ANALOGICAL INFERENCE

The meanings of symbols are therefore functions of relationships within a complex network which constitutes language, culture and social structures in general. Symbols communicate in particular, holistic contexts, and are typically learned by analogies and discriminations within particular situations, not by generalizable rules. The same emphasis on the local, the concrete, and the contextual emerges in studies of the place of analogy in modern science. These indicate that science too rests essentially on inference from the concrete, although it goes beyond it in ways that are connected with the overriding goal of scientific "objectivity" ; unlike symbolism, the "objective" goal of science as generally understood is successful prediction and control of the natural environment.

The logic of analogical inference in science is an extension of what W.E. Johnson (1924 : 43) called *eductive* inference in contrast to *inductive* inference to generalizations and laws. The

traditional problem of induction arose from the attempt to justify two types of elementary argument : the derivation of universal generalizations from particular data ("All crows are black"), and the derivation of properties of the next instance from observed instances of the same kind ("The next crows to be observed will be black"). The latter is eductive inference, and is weaker than induction to generalizations, requiring therefore weaker premises for its justification. It does, however, in common with all types of induction, involve recognition of instances of *the same kind*, and it is here that the notion of analogy enters at the root of all scientific inference. No two particulars in nature are alike in all respects ; what traditional induction has assumed is that instances that are "sufficiently alike", or "alike in essential respects", constitute suitable sets of data for both inductive and eductive inference. Eductive inference from particulars to particulars makes the requirement of *analogy* between instances explicit, and can be generalized to give a probabilistic version of the standard form of analogical inference : if A and B are known to be similar in respects which outweigh their differences, then it is more probable than not that A and B will be alike in further respects. Further generalization of this logic gives the form of argument from models in science ; if two physical systems (for example water waves and light) are similar in some properties and behaviour, then they may be assumed, at least for the sake of a useful hypothesis, to be similar in other related respects. Expression of the forms of these inferences begs many questions which remain to be discussed, but they may be usefully summarized for our purposes in a general *clustering postulate* which represents the underlying assumption of all scientific and indeed everyday inference : all other things being equal, assume that the world will continue to be more similar to than different from what has already been observed.

Eductive inference is not in conflict with other standard accounts of scientific method, but it is essentially local, particular and contextual, and makes fewer demands upon the universalizability of law-like relations and theories. It can therefore be transferred directly from the natural to the human sciences, which also require local, particular and contextual inferences. Judgements of sufficient analogy become crucial, as we have seen in archaeological examples. This should not be regarded, however, as a radical departure from scientific method, but as an extension of it which makes explicit what is always implicit in inductive and theoretical inference, however disguised in the elaboration of theoretical structure in the natural sciences. The method also retains an observational basis, unlike forms of constructivism which claim that all theories in the human sciences are merely in the eye of the beholder.

The pervasive character of analogical inference gives sufficient justification for the view recently expressed by archaeologists, that if the choice is to stop at the limits of data or to make speculative hypotheses on the basis of analogies with comparable systems, then it is better to make the hypotheses, even though there may in the end be no way of deciding conclusively which hypotheses are true. Neither is there any such way of deciding in the natural sciences. It should be noted in conclusion that although this prescription sounds like Popper's justification for "risky" hypotheses, it is not the same, because it appeals to an *inductive* type of reasoning generalized to include analogy, and this is a much better reflection of archaeological and anthropological practice than Popper's strictly hypothetic-deductive methodology. The science of the concrete postulates fundamental analogical structure between particulars in terms of which a logic of induction is possible, and this logic is common to the natural and the human sciences. The task that remains is to spell out from particular examples what are the criteria and constraints for good analogical inductions.

BIBLIOGRAPHY

HESSE, M.

1988a. The cognitive claims of metaphor. *Journal of Speculative Philosophy* 2 : 1-16.

1988b. Theories, family resemblances and analogy. In *Analogical Reasoning*, edited by D. Helman, pp. 317-340. Kluwer Academic Publishers. Dordrecht.

HODDER, Ian. 1986. *Reading the Past*. Cambridge University Press. Cambridge.

JOHNSON, W.E. 1924. *Logic*, Vol. 3. Cambridge University Press. Cambridge.

LEVI-STRAUSS, C. 1966. *The Savage Mind*. Weidenfeld and Nicolson. London.

SHANKS, M. and TILLEY, P. 1982. Ideology, symbolic power and ritual communication ; a reinterpretation of Neolithic mortuary practices. In *Symbolic and Structural Archaeology*, edited by Ian Hodder, p. 129.

VON GERNET, A and TIMMINS, P. 1987. Pipes and parakeets : constructing meaning in an Early Iroquoian context. In *Archaeology as Long-term History*, edited by Ian Hodder, p. 31. Cambridge University Press. Cambridge.