kind familiar in the major river valleys of England do not appear. However, the somewhat limited range of the crop-marks is more than compensated by the numbers and diversity of earthworks occurring in almost every county. J. K. ST JOSEPH

[1] The first publication of air photographs of archaeological sites in Ireland seems to have been by D. A. Chart, ANTIQUITY, 1930, 453-9, pls. I-VII: the recent volume on County Down, in the *Archaeological Survey of Northern Ireland*, HMSO, Belfast, 1966, includes a selection of air photographs.

[2] The references are to the kilometre grid printed on the half-inch to a mile maps of the Ordnance Survey of Ireland.

More on Models

Bruce G. Trigger, Associate Professor in the Department of Anthropology, McGill University, Montreal, has sent us the following note after reading Dr Colin Renfrew's 'Models in Prehistory' last June (ANTIQUITY, 1968, 132). *At our invitation Dr Renfrew has added a brief comment.*

Colin Renfrew's note appeared when I was completing a study of the role that models have played in the interpretation of Iroquoian prehistory to present at the 1968 Conference on Iroquois Research [1]. Because of this, I read it with special interest. My study of changing fashions in the reconstruction of Iroquoian prehistory during the past hundred years provides a striking illustration of Renfrew's dictum that 'it is the choice of model which is often decisive, rather than the material evidence'. Moreover, work I have done elsewhere convinces me that this situation is typical rather than exceptional [2]. It is perhaps understandable that in the early days of the development of their discipline, prehistorians, like their colleagues in history, preferred to regard models as being inherently implicit and often treated their reconstructions of the past as personal flashes of insight. With growing historical perspective, however, we can see that most of their reconstructions were in fact based on fairly mundane notions about cultural processes that were fashionable at the time. For example, 50 years ago it was possible for archaeologists to interpret the short period of Sudanese rule over Egypt in the 8th century BC as follows:

> But soon the unfailing dynamics of race reasserted their force. No black people has ever permanently maintained its grip on a North African country . . . If a short-lived and unstable black empire has occasionally extended its limits to within view of the Mediterranean, it has ultimately been repelled all along the line. From Morocco to Tripoli the white North African races have triumphed, . . . and have driven the negroes back to their home in the tropics [3].

These are not the words of racist bigots, but of archaeologists who were uncritically interpreting archaeological evidence in the light of the commonly held opinions of their day about the relationship between race and cultural behaviour. The same ideas about Africans generated the so-called 'Hamitic hypothesis' and led to the stubborn refusal of many people to admit that the prehistoric stone architecture of Rhodesia could be the work of people with black skins. The real danger, in most instances, is less the models themselves than that, because of intellectual inertia, reconstructions based on false models may manage to survive long after these models have been rejected.

It may be argued that for the most part interpretations based on wrong or inadequate assumptions about the nature of human behaviour will eventually run aground on the shoals of accumulating archaeological evidence. In spite of this, I believe that it behoves archaeologists to be aware of the assumptions that underlie their interpretations of archaeological data. This can be done by systematically examining previous interpretations of the culture history of the area in which they are working as well as by studying the history of archaeological interpretation elsewhere. The latter is especially important because, to a large degree, the assumptions that have influenced the interpretations of data in one area at a particular period are likely to have been influential elsewhere. An awareness of the intellectual history of the discipline cannot help but be of assistance in making prehistorians more aware of the

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assumptions that underlie their own interpretations.

I was, however, somewhat disturbed about the particular distinction that Dr Renfrew wishes to draw between models and theory. The former are defined as 'the underlying assumptions implicit in an explanation'; the latter, so it would seem, are specific reconstructions of the past. As an example of a model (not necessarily a valid one) we might cite: culture change is best explained in terms of migrations of people. A 'theory' based upon this model might be: all the Indo-European languages are derived from the Kurgan culture of Central Asia of the 3rd millennium BC. This terminology seems to me to place undue emphasis upon the popular definition of theory as 'the sphere of speculative thought'. The more formal dictionary definition of a theory as a 'supposition explaining something, especially one based on principles independent of the phenomenon to be explained' seems to come closer to Dr Renfrew's definition of a model. I would suggest that both of the examples given above can be regarded as theories, in a broad sense. The first example, however, is a general theory about cultural processes; the second a specific theory about an event in the past. Clearly, only the first sort of theory deserves to be recognized as being a model. This usage identifies models with general propositions about the nature of culture and human behaviour and prevents the term from being identified with specific reconstructions of particular historical events. The term thus clearly refers to the nomothetic or theoretical component of prehistory, rather than to its ideographic or historicizing aspect.

In my own thinking, I have found it useful to draw a further distinction between two kinds of models, which I have labelled *processual models* and *procedural models*. I believe that this distinction may be of some general interest.

Processual models are the models about cultural processes and human behaviour that the archaeologist uses to interpret his data. These models concern matters such as the relative importance of migration, independent development and diffusion as sources of cultural change or particular aspects of the relationship between material culture and social organization. As Dr Renfrew has suggested, these concepts are 'worth discussing in their own right, rather than simply as the background to a specific problem'. It should be noted, however, that these problems are not unique to prehistory, but rather are concerns about the nature of human behaviour that prehistory shares with general anthropology and with some of the other social sciences. In so far as the ultimate objectives of archaeology are the study of man, and not merely of material culture in isolation from the social and cultural context that produces it, this relationship is not at all surprising. Processual models thus not only are nomothetic, but represent an area of interest that prehistorians ideally hold in common with the social sciences.

Procedural models are assumptions about the relative importance of various classes of data for the reconstruction of prehistory and the manner in which these classes of data can be articulated with one another. In Britain, more than in America, it is appreciated that archaeological data are not the only sources of information about prehistory, especially as one approaches the historic period. Other sources of information include linguistics, oral traditions, physical anthropology and ethnology; to say nothing of written records, if we are dealing with a parahistoric culture. These other sources of information each requires an independent discipline which involves training and skills of its own. It is the prehistorian's duty to consider the results of all these lines of investigation thoroughly and to synthesize the results in his reconstructions of culture history. In order to do this, it is necessary to make a variety of judgements concerning the significance and relative importance of various kinds of evidence each of which requires a general knowledge of the fields being considered. For example, the use of legends to interpret archaeological findings can only proceed on the basis of assumptions concerning the relevance of oral traditions and the relative importance that is to be accorded them in comparison with the archaeological data. In the past, this tended to be done impressionistically by archaeologists,

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but today the need for increasing sophistication in the interpretation of the oral traditions themselves is being recognized. Judgements about the relative significance of different kinds of data are made on the basis of ideas about the nature of culture and of human behaviour. Nevertheless, because these judgements constitute general procedures for handling and integrating data, they are judgements one step removed from the assumptions about cultural processes that constitute processual models. Because these models concern the relative significance and tying-together of data, I suggest they be termed procedural models. Within this category may also be included the assumptions that underlie particular archaeologists' preferences for an ecological, as opposed to a demographic or evolutionary, approach to the study of prehistory as well as the efforts that are made to integrate these various approaches. Unlike processual models, which are about general problems of human behaviour shared with the social sciences, procedural models concern the techniques that prehistorians use to order their interpretations of the past. Thus, the effort to make these models explicit and to articulate them into a coherent structure is ultimately an attempt to provide an explicit theoretical structure for prehistory as a discipline.

NOTES

[1] 'The Strategy of Iroquoian Prehistory' presented at Rensselaerville, New York, 5th October 1968.

[2] B. G. Trigger, *Beyond History: the Methods of Prehistory* (1968).

[3] D. Randall-MacIver and C. L. Woolley, *Areika* (1909), 2.

Dr Renfrew writes:

Clearly there are models and models. Professor Trigger emphasizes eloquently the importance of understanding the implications of those which we use, and suggests a division into two classes. It is perhaps worth remembering, however, that Chorley in *Models in Geography* (reviewed on p. 74 of this issue) classifies models into many types, including iconic, analogue, symbolic, scale, hardware, experimental, etc.

In my note I distinguished, as is usual in the physical sciences, and as Braithwaite does, between model and theory. The model here is an *as-if* model, an analogue model. And I specified a second use of the term to imply 'model of the past', that it to say the whole framework in which we are working, be it diffusion-oriented, ecology-oriented or whatever. We might call this a *framework* model, as distinct from analogue (as-if) models, which are less basic, dealing with more specific problems.

Professor Trigger essentially restricts his discussion to models of this framework type, dividing them into processual and procedural. His discussion is an interesting one, and the attempt to understand and classify the modes of thought which we employ evidently worthwhile. And his discussion does not contradict the distinction which I should like to draw between analogue and framework models in archaeology. But I have doubts whether his discrimination between process and procedure is entirely valid.

Surely judgements about 'the relevant significance of different kinds of data' (i.e. selection of procedure or approach) determine the framework of thought in which the archaeologist works. They directly imply assumptions 'about cultural process and human behaviour that the archaeologist uses to interpret his data' (e.g. decisions about the relative importance of migration and other processes of culture change, or relationships between material culture and social organization). If an archaeologist prefers an 'ecological as opposed to a demographic or evolutionary approach' (a procedural decision), this automatically implies an opinion about the general problems of human behaviour and of culture change, which Trigger defines as processual. Since the archaeologist is working in the first instance with material data (a constraint that in no way denies his objective of studying man and society), his procedural approach to the data and his understanding of the processes of culture and culture change are logically and inextricably bound. As I see it the approach to both will be governed by the framework model which he employs.

While agreeing with much of what Professor Trigger writes, I feel, therefore, that the

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distinction between procedural and processual models is a doubtful one. The archaeologist's procedure depends essentially upon the view of culture and culture process—the framework model—which he employs. And often—as the use of computers in archaeology is teaching us—the framework model is in turn influenced by developments in archaeological procedure.

A Visit to William Cunnington's Museum at Heytesbury in 1807

We are indebted to Mr L. V. Grinsell, Curator of Archaeology in the Bristol City Museum, for sending us this interesting note.

The celebrated 'Stourhead Collection', which is largely made up of the collection of grave-groups from Wiltshire barrows opened by Sir Richard Colt Hoare and William Cunnington, was in fact originally housed in a summer-house at the bottom of the garden of William Cunnington's house at Heytesbury. The *Guide Catalogue* published in 1964 contains an account of this summer-house, written by William Cunnington's daughter Elizabeth [1]. From this one is left wondering whether the collection remained for any length of time in a building that sounds anything but waterproof, or whether as the collection grew it might have been moved into the house. William Cunnington died in 1810, but the collection of antiquities was not transferred to Stourhead until 1818. It remained there until 1878 when it was transferred to Devizes.

On 17th November 1807, the collection at Heytesbury was inspected by Richard Fenton, whose visit is described in his anonymously published *Tour in Quest of Genealogy though Several Parts of Wales, Somersetshire, and Wiltshire, in a Series of Letters to a Friend in Dublin* (1811). His account (pp. 251–5) follows:

Deadford Inn, November 17, 1807.
[Deptford Inn, near Wylye.]

MY DEAR CHARLES,

BREAKFAST over at Warminster, . . . we lost no time to make for Heytesbury, no great distance off, and were no sooner alighted than we called to see the museum, containing the contents of the different tumuli that have been opened for these ten years, under the patronage of Sir Richard Hoare, and the direction of Mr Cunnington, who has the care and the management of it. This gentleman, who has all the enthusiasm that is necessary to excite the mind to a pursuit of this sort, appeared to be highly gratified by our visit, as well as the zeal we expressed at the prospect of a new epoch in antiquarian literature, from the splendid work Sir Richard Hoare had in contemplation [2]. Nothing could be more curious and systematic than the arrangement of the museum: the contents of every tumulus was separate, and the articles so disposed as in the case of ornaments, such as beads, in such elegant knots and festoons, as to please the eye which looks to nothing farther. The story of several was so perfectly told by the relics they contained, that an epitaph could not have let us more into the light of the rank and character of the dead. In one drawer were displayed all the utensils employed to fabricate arrow-heads, other weapons and implements that required sharp points, there being various whetstones, of a coarse and a finer grit, with grooves in each, worn down by the use made of them; together with bone in its wrought and unwrought state, evidently proving it to have been the sepulture of an artist, whose employ this was. In another we were shown some flint arrow-heads, very similar to those I saw at Milford, which had been dug out of a turbary in the island of Nantucket, which Mr Cunnington accompanied with the history of the tumulus wherein they lay. About three feet from the apex of the barrow, in digging they came to the skeleton of a dog, and from the fineness of the bones supposed to be of the greyhound kind; but when they got to the level of the surrounding ground (where, in general, the interment is found), in the centre, on the ancient sward then apparent, they came to a heap of ashes, mixed with some few particles of bone, not perfectly calcined, as is always the case, and surrounded by a wreath of stag's horns. In the middle of the ashes were discovered the flint arrow-heads, and a curious

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