

This effect has become evident in the context of 'longitudinal' ethnographic studies, which involve observation of the subject society over a period of several decades. It has been possible to isolate processes operating over the 'long term' that are not evident within the shorter periods studied by traditional ethnology. Since such distinctions can be discriminated within periods of time that are relatively short in comparison to those often involved in archaeological analysis, it is essential to consider the effect of time perspective. This should not imply a dichotomy of methods or issues relating to short- vs. long-term categories, but a continuous spectrum: explanatory principles must be employed that can be expected to operate over the period that is under consideration. Hence, the problem for the archaeologist becomes one of identifying variables and models appropriate to the time framework being studied. The papers assembled here deal with a number of time frameworks and show the variety of issues to be considered.

Within the context of a specific society, the way in which time is perceived is problematic: time may be measured according to social necessity rather than regulating and defining that necessity. Shanks and Tilley argue for the importance of perceived time intervals as opposed to the abstract chronology generally used in archaeology. They criticise the projection of modern systems of time measurement onto other cultures as a temporal imperialism justifying the status quo.

Sinclair and de Montmollin also discuss this aspect, observing that different concepts of time can be held by different classes within the same society. The argument is illustrated in two quite distinct historically known societies -- prehispanic Mesoamerica and 17th-18th century England. In both, time reckoning and scheduling of activities is seen to vary according to social class. De Montmollin contrasts the effect that these concepts may have on the timing of events with that predicted within abstract 'managerialist' models that have often been used in analysis of Mesoamerican and other complex societies.

The problem of identifying processes appropriate to the time frame in question is addressed by McGlade in the context of computer modelling. This seems to offer the possibility of 'condensing' time in order to explore assumptions about the intervals within which particular processes may be defined. As Bailey notes, behaviour at any point in time represents the intersection of processes that are both defined and operable over varying time spans. McGlade's method seems to offer the possibility of incorporating the effects of interacting processes.

The papers collected here approach the subject of time from many different perspectives. This is entirely appropriate, for many different time frameworks have been considered.

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BREAKING THE TIME BARRIER

Geoff Bailey

Temporal Awareness and Temporal Horizons

Awareness of time is one of the fundamental characteristics of the human brain. According to Davis (1981), a capacity for 'separated learning' -- the ability to relate events which are remote in time and space, and to draw consciously on past experience in order to make predictions about the future -- is uniquely human, more so than the capacity for symbolic thought, language or art, all of which can be found in at least rudimentary form in other species. Many animals anticipate the future to a small extent, and some have long memories, but none are capable of relating events separated by a time interval of more than about one minute. The temporal envelope, past and future, within which they live is extremely limited, even for our closest living relatives, the chimpanzees (Davis 1981, 131). In contrast, our own temporal horizon is capable of extending almost indefinitely into past and future.

How far back in our evolution as a species such abilities were present is uncertain. A fully modern capacity for temporal awareness can reasonably be associated with the appearance of anatomically modern humans, at least 100,000 years ago. Gowlett (1984) has argued for mental abilities associated with the earliest tool-making 2 million years ago which imply a temporal horizon -- limited perhaps by our standards but greater by some order of magnitude than that displayed by any other living species. It follows that time concepts should play an important role in archaeological interpretation, in two ways: firstly because people have clearly had varying concepts of time in the past which have influenced their thoughts and activities and hence the nature of the material record left for archaeologists to explore and interpret; secondly because varying time concepts influence our own thinking as archaeologists, often unconsciously, and thus insidiously permeate discussions of archaeological theory and methodology. It is this latter issue which I wish to examine further here.

Archaeologists have devoted little attention to the ways in which time concepts affect their interpretations. Undoubtedly one obstacle is the purely technical one of imperfect dating methods, and the preoccupation with matters of chronology. A recent survey of central government funds in the UK devoted to archaeological research over the period 1979-1984 shows a total expenditure of £7.7 million (excluding rescue archaeology), of which fully one third was devoted to improved dating techniques (Hart Report 1985). Much more work remains to be done, and even simple chronological relationships are often matters of controversy, so that conceptual issues are easily pushed into the

background. However technical developments cannot be divorced from conceptual ones. Even such a seemingly simple notion as 'contemporaneity' can be defined in many different ways according to a variety of preconceptions, so that resolution of the degree of contemporaneity between two archaeological events is as much a conceptual problem as a technical one (Papaconstantinou 1986).

I have covered some of the ground in more detail in two previous papers (Bailey 1981; 1983). Here I wish to clarify the general argument by emphasising the contrast between substantive uniformitarianism and time perspectivism as alternative ways of viewing past behaviour. These are related to two quite distinct concepts of past time: egohistorical (or egocentric) in which the past is always viewed retrospectively from a single, fixed point of view in time, i.e. the present; and allocentric, in which the past is viewed prospectively from earlier to later developments, from different points of view in time and at different time scales. My own preference, as will become clear, is for a time perspectivist and allocentric position. I should preface my remarks by making explicit my own archaeological perspective and temporal horizons, which are those of someone who works primarily with the archaeological record of about 100,000 to 10,000 years ago (with occasional forays into later and earlier periods), and with the study of prehistoric economy.

Substantive Uniformitarianism and Time Perspectivism

By substantive uniformitarianism I mean the belief that processes operated in the past which are similar to those visible at the present day, in other words that there are universal principles. Stated thus, I do not dispute the point. However substantive uniformitarianism often embodies an additional and usually implicit notion that the only processes that operated in the past are those visible at present. From this follows the argument that in studying prehistoric behaviour we should expect the same sort of patterns to be manifest as at present, and thus ask the same sorts of questions of our archaeological data, apply the same sorts of concepts, and invoke the same sorts of explanatory principles as we do when studying present-day behaviour. This presupposes that we know the present, with which we are in direct contact, better than we can know the past. Hence the order of progression in the growth of knowledge is from the better known present to the less well known past¹.

This is such a common mode of thinking in archaeological interpretation that it seems almost superfluous to enumerate examples. The source of inspiration for many currently popular approaches to archaeological interpretation is readily apparent in the literature of human ecology, human geography or sociology. These are all disciplines concerned, by definition, with relatively short time spans, and primarily with the study of small-scale processes.

Substantive uniformitarianism has a methodological corollary; for whereas we can observe and interrogate living people, we can do so only indirectly for the past. The primary data of the archaeologist are at least one step further removed from the phenomena of interest than are the primary data of the contemporary observer. Thus, so the argument runs, the archaeologist has to engage in an elaborate exercise of translating, decoding, transforming, or otherwise cleaning up the material record. Inferences from archaeological data seem unavoidably difficult and unreliable, and give rise to a special methodological literature and terminology involving such concepts as 'ethnographic analogy', 'formation processes', 'middle-range theory', 'taphonomy' and 'contextual analysis'².

Substantive uniformitarianism thus presupposes that the study of past behaviour is substantively similar to the study of present behaviour, but methodologically different and essentially less reliable.

By time perspectivism I mean the belief that different time scales bring into focus different sorts of processes, requiring different concepts and different sorts of explanatory variables. Behaviour at any point in time reoperates the intersection of processes defined by varying time-spans of operation, ranging from phylogenetic processes at macro-scales of millions of years at one extreme, to neuropsychological ones at micro-scales of milliseconds at the other, with a whole range of social, economic and demographic processes at intermediate time scales. Which of these will be in focus will depend on the time perspective of the observer and the time depth of observation. Since it is impossible to bring into simultaneous focus the entire array of processes at one scale of observation, it is necessary to define the time spans over which particular variables have an observable effect, before considering how they interact. On a time span of days to decades, for example, what we see of behaviour is dominated by individual action and the social interactions between individuals. On a time span of decades to hundreds of years, interactions between individuals and the larger social groupings of which they are members, and political interactions between such groupings, come more into focus. On a time span of hundreds to thousands of years the inertial lag of demographic and economic trends are more clearly discernible, while the effect of individuals and small-scale social interactions fades out of view. Small-scale environmental trends also begin to emerge as relevant variables at this timescale, for example, small changes of temperature or precipitation on a regional or continental scale. On a time span of tens of thousands to hundreds of thousands of years, the major global climatic and environmental changes of the glacial cycle dominate the field of view, and on a span of hundreds of thousands to millions of years phylogenetic changes involving the extinction of species and the evolution of new ones.

Time perspectivism is best exemplified in the earth sciences, which deal with the longest possible span and the widest spectrum of scales, ranging from hundreds of millions of years for large-scale changes in the configuration of continents and oceans under the impetus

of plate movements, to changes in stream behaviour and sedimentation patterns on a scale of years to decades.

It should be emphasised that time perspectivism does not assert that small-scale processes visible in the contemporary world did not operate in the remoter past, or that they did not affect the lives of prehistoric people. Nor does it of itself imply any value judgements about the superiority of particular scales of observation. What it does assert is that the small-scale processes that dominate our lives and surroundings as living individuals cannot be assumed to be the only processes operating. They are not necessarily the most appropriate variables to study when we view behaviour on a larger scale and over longer time spans, nor the most easily accessible. Similar reservations apply to the transfer of large-scale concepts to the explanation of small-scale phenomena, since the variables involved may change so slowly, or have so little effect over shorter time spans, that they can be treated as virtually constant at a small scale of observation.

Time perspectivism thus presupposes almost the exact reverse of substantive uniformitarianism. In this view the past, or rather what we can effectively investigate of past behaviour, is substantively different from the present, especially as we go further back in time and hence to longer scales of observation. Its study, however, is methodologically similar, involving methods of inference which are neither more nor less difficult than those used in the study of contemporary behaviour. The growth of knowledge, far from proceeding backwards in time from the present to the past, proceeds from the larger scale to the smaller scale, and hence from the past to the present, each scale of observation providing a perspective or framework within which to evaluate smaller-scale phenomena visible at the next scale down in a hierarchy of successively smaller-scale perspectives. The present is interpreted in the light of the past, rather than the other way about, although in practice knowledge may grow through multiple interactions between many different time perspectives³.

Difficulties with Substantive Uniformitarianism

There are, it seems to me, four principal difficulties with substantive uniformitarianism. Firstly, it implies the superiority of studies of the present over studies of the archaeological past, while at the same time denying any possibility to the archaeologist of putting such an implication to the test. The argument seems to run something like this. Since general concepts, theories and principles can only be derived from the study of contemporary processes (and archaeologists themselves patently seem to believe this because that is where they go for their interpretative models), and since the data of archaeology are too fragmentary and feeble ever to show up any possible weaknesses in these general models, it follows that archaeology is doomed to the role of a subservient discipline, destined to consume the general insights of others, but never able to generate any of its own. In short, the archaeological study of the past cannot tell us anything of importance that we did not already know. It is therefore a pointless intellectual

discipline, except perhaps in so far as it clothes in a narrative framework of particular instances the generalisations of other disciplines.

It would not be surprising to find this attitude to the past expressed by human ecologists, geographers and sociologists, if only out of professional self-interest. Sometimes it is so expressed, as in Sir Edmund Leach's well-known comments as observer at archaeological conferences. On the other hand it should be noted that it was another social anthropologist, Evans-Pritchard (1961), who provided what is still one of the most powerful and coherent statements of the role of time-depth in anthropological generalisation. It is rather unexpected to find archaeologists themselves willing to cut the intellectual ground from under their feet in this way. Some, like Trigger (1978), actually make a virtue of this, claiming that archaeology should concern itself with the particular rather than the general, and confine interpretation to the explanation of specific cases in the past with generalisations drawn from disciplines which study the present.

A second difficulty with substantive uniformitarianism is that it does, as its very label suggests, require a belief in substantive uniformities of behaviour which have persisted, unchanged, through long periods of time. This seems an especially paradoxical principle for archaeologists to adopt, for it is taken as axiomatic by most that the very essence of human behaviour is its variability. Many archaeologists would accept that one of the goals of the discipline is the study of change or variability (though some would define the goals in terms of the search for continuities and uniformities). Yet here we are being required to assume uniformity, at least in some aspects of behaviour, and furthermore to seek those uniformities in the short time-spans of the recent record, instead of in the long-term record where one would logically expect such an investigation to begin.

This leads on to a further difficulty. Let us grant that there are some substantive uniformities of behaviour and that these are to be sought in the contemporary record. How are we to decide which relationships are enduring and which ephemeral? Does the presence of transhumance in the historical period in the Mediterranean, for example, point to uniformities of seasonal land-use patterns which can be extrapolated through the past 30,000 years (e.g. Higgs *et al.* 1967), or is it a response to particular social and historical circumstances which lasted only for a few centuries (e.g. Lewthwaite 1981)? We do not know the answer, or at any rate we cannot assume such a uniformity, unless either we have some means of obtaining independent knowledge on this point from the archaeological record, in which case the whole basis for substantive uniformitarianism ceases to exist, or we assume the very matter that requires investigation. We face a similar problem with a whole range of ethnographically or historically observed behavioural practices, from dietary patterns to bodily decoration. It must be admitted that some archaeologists, while not exactly claiming circular reasoning as a virtue, certainly see it as no vice, on the grounds that, since all observations are theory-dependent, all reasoning from

observations is circular, and one might as well say what one likes. This argument I believe to be entirely specious, based on an oversimplification of the theoretical component in empirical observation⁴. Taken to its logical conclusion such an argument would compel us to abandon not only study of the archaeological past but any sort of empirical observation. Such an argument is undoubtedly appealing to those who are trying to extract from the archaeological record information that it cannot yield, since it spares them the need to make their own attempt at empirical investigation, while preserving their claim to dismiss everyone else's.

The final difficulty with substantive uniformitarianism is that it presupposes that we know where the boundary lies between 'the present' and 'the past', as if these were two unequivocal and established categories, and not open to doubt or differences of opinion. Where exactly do we draw the line between observations of the 'present' and observations of the 'past'? We could say that the present is anything that we observe directly with our own eyes. However, if we wish to know about our contemporary world, direct observation in this sense would leave most of us with an impossibly limited view. The reality is that a great deal of what we claim to know about the contemporary world around us depends on 'second-hand' observation through books, newspapers, television and the observations of others. Most of these observations are of course not telling us what happened in the immediate here and now, but what happened a few minutes, hours, months or years ago. Already the duration of time implied by the concept of the present has started to become blurred. If we allow that we can define as contemporary those phenomena which fall within the scope of some written records, such as newspapers, why not those phenomena which fall within the scope of all written records? Who is to say that ancient texts are any less reliable as guides to the world they record than our own newspapers, or any less amenable to cross-checking from other sources? If ancient written records are acceptable as a source of information, why not archaeological data themselves, which are after all a sort of record, accessible to direct observation and equally susceptible to its own methods of interrogation and cross-checking?

Perhaps we should define the present differently, say in terms of living systems. In the case of cells we might then be talking about a time-span ranging from hours to years, at the level of the individual organism years to decades, at the level of social and ecological communities much longer time-spans. It seems that this definition is no more helpful in defining an absolute boundary. Perhaps, then, we should define as contemporary what is coterminous with our own individual life-span. But this will not do either. For we know that there are many people alive at this moment who were born before us, or who will die after us. The reality is that concepts like past and present are, like other concepts, theoretical constructs, and the boundary between them is essentially an arbitrary break on a continuum. Where we draw that boundary will depend on the time-span over which our preferred techniques of observation extend, and the time depth of the processes we happen to be interested in.

The application of substantive uniformitarianism in archaeology rather resembles the case of the geophysicist who wishes to use a satellite telescope in order to demonstrate that from the point of view of a person standing on the ground the earth's surface appears flat; or the biologist who, wishing to analyse the molecular structure of mammal tissue, pursues that interest by driving around a safari park with the steering wheel of a landrover in one hand, a pair of binoculars in the other, and a notebook between the knees. One can imagine our hypothetical scientists thinking that they were engaged in an enterprise of supreme methodological difficulty involving great feats of technical ingenuity, just as one can imagine the reaction of most outsiders, who would dismiss the results as being so trivial or so unreliable as scarcely to be worth contesting. These examples are obviously absurd, because they quite deliberately invoke a mismatch between the scale of the phenomena under study and the scale of observation. In fact a telescope above the earth's atmosphere could give some new and very interesting information about the outer reaches of the universe, while the landrover and the binoculars are indispensable aids for those who study the behaviour of mammals as members of ecological communities. Yet it is precisely this mismatch, between scale of observation and scale of phenomena studied, which follows from the extrapolation of concepts and theories derived from the short-term record of the recent past onto the longer time spans of the archaeological record, and which inevitably leads archaeologists into statements of the obvious or attempts at the impossible.

Difficulties with Egohistorical Concepts of Time

Like substantive uniformitarianism, an egocentric view of the past sustains the presumption that the past is in some sense inferior to or subordinate to the present, without providing any grounds for questioning or evaluating this assertion. An egocentric concept of time assumes that our present world is the most important one, which provides us with our frame of reference and our values for interpreting all other worlds. In one sense this point of view is inevitable and important, since we can never fully escape the influence of our present circumstances. It is after all our lives, our problems, our survival that are in question. However, an egohistorical view of the past imposes certain distortions of perspective which may not be apparent, if it is thought to be the only reference point from which to view human behaviour. For example it can easily give to the past the appearance of a cumulative, directional process, leading up to the present, with phenomena becoming more advanced, more developed, more complex, more progressive, as one moves forward in time, and so more interesting and more relevant to our present-day concerns, indeed more like ourselves, which we are inclined to regard as the most complex and important phenomena of all. This may not be wholly illusory but clearly stems from, and obviously greatly reinforces, the tendency to study in greater depth and know more about what happens close to us in time and space and thus to see more of its detail and complexity. Conversely, as one moves backwards in time, so things appear to become more simple, more primitive, more backward, more regressive, until they disappear from view altogether, thereby defining

a temporal boundary or discontinuity, beyond which lies nothing of interest, or at any rate nothing that is accessible to study. This egocentric view of the past is clearly expressed in the idea of progress, which has been prevalent since the 18th century, was vigorously promoted in 19th century notions of social evolution, and remains the dominant philosophical bias of 20th century thought, though in much modified form (Gellner 1972).

This creation of boundaries or discontinuities also serves to separate us from our past and make our world seem different, perhaps uniquely so, from all previous worlds. Once these discontinuities are accepted, radical transformations of behaviour -- 'revolutions' -- have to be invoked to overcome them. Many, for example, see a discontinuity at the beginning of the industrial era -- the 'Industrial Revolution' -- which so altered the circumstances of human life that the study of what came after requires entirely new and different concepts and principles from the study of what came before. Others see the origins of language and symbolism as the radical discontinuity (the 'Upper Palaeolithic Revolution'), which sets apart the discussion of human behaviour from non-human. For many archaeologists the agricultural revolution defines a critical threshold. This is especially common among those who work on the later prehistory of Europe, commonly taken to mean prehistory from the Neolithic period onwards. For them the Neolithic Revolution provides a convenient demarcation and justification of their field of interests, spatially as well as temporally (since agriculture is commonly held to have originated outside Europe as well as before the Neolithic).

These discontinuities can result from purely practical considerations, since they often arise from and help to maintain convenient demarcations of a field of enquiry, defining the scope of its interests and the temporal range of its techniques of observation. In this case the discontinuities are by definition peripheral to investigation, and their precise nature and causes are regarded as problems for others to study. Conversely, for archaeologists interested in culture process, the discontinuities may become the central focus of interest, thereby achieving an exaggerated importance. In either case the discontinuities in the past, and the revolutions required to overcome them, come to be taken for granted as 'facts' of history. Clearly such an egocentric view of the past can and does serve the purpose of providing a barrier between our present human condition and our non-human past, by interposing a series of critical thresholds in the transformation of human behaviour which have carried us progressively further from our material and biological origins, and thus helps to reinforce our wholly egocentric notion of our own uniqueness and superiority. Yet it is questionable whether the existence of revolutionary transformations, representing points of origin in time for various phenomena to which we attach importance in the present era, is anything other than an illusion, reflecting an arbitrary discontinuity imposed by a limited temporal horizon, in much the same way that the convergence of parallel lines to a vanishing point on our visual horizon is no more than a trick of visual perspective.

The alliance of egocentric attitudes to the past with substantive uniformitarianism leads to yet a further paradox. For if our era is unique, and separated from previous eras by radical discontinuities, and if it is influenced by quite different principles of behaviour and action, how can anything we know about our own era serve as the basis for extrapolation to previous ones?

Why, then, do archaeologists cling to substantive uniformitarianism in spite of its apparent logical deficiencies, its paradoxes, and its absurdities? Have I left something out of my account of uniformitarianism? Or are the objections to time perspectivism even more insuperable?

Methodological Uniformitarianism

In fact, I have left out one important element in the uniformitarian position. As geologists, who first launched the concept, have come to realise, uniformitarianism is an ambiguous principle involving two quite distinct concepts (Gould 1965). Substantive uniformitarianism, as I have described it above, has in fact been discarded in geology, where it has become obvious that many processes operated in the past which are not visible in the present, either because they have ceased to operate, or because they operate so slowly or in such a complex fashion that their effects are only clearly visible after long periods, as, for example, in the movement of tectonic plates and the uplift of mountain ranges.

Methodological uniformitarianism is something quite different. This entails a belief that certain uniformities are sufficiently constant to be extrapolated back in time as references against which to measure variation in something else. In the natural sciences these uniformities are physical and chemical constants. Since these form the basis for scientific observation of many phenomena, whether past or present, methodological uniformitarianism turns out to be no more than a statement of scientific method by another name. We are familiar with many of these constants in science-based archaeology, for example in the use of the half-life of radioactive isotopes as a method of dating. There are also biological constants, used, for example, in palaeoclimatic studies, where the varying proportions of different plant and animal species within a stratigraphic column are used to investigate climatic variation. The methodological uniformity involved is the assumption that the habitat preferences of species observed under present-day conditions have remained constant through time. Since organic phenomena are more variable than inorganic ones, the 'constant' may sometimes turn out to be liable to some variation, and the assumption open to question.

There are many cases of the use of such methodological uniformities in archaeology, for example: the span of the human arm as a measure of variation in the discard of artefacts around fireplaces; the fixed structure of animal skeletons as a measure of variation in the human butchery of animal carcasses; a two-hour walk as a defining limit of

daily activity from a given point in the landscape, used as a measure of variation in principles of site location; the nutritional needs of the human individual, used as a measure of variation in subsistence economy. These uniformities and many others like them are, of course, statements of biological or physiological function. As such, their application to archaeological interpretation is often considered a statement of the obvious, or a 'dehumanising' of the study of the past. This criticism misses the point. It is precisely because the uniformities are statements of the obvious that they can be extrapolated to other temporal contexts with some confidence. And they are only dehumanising to the extent that they become transformed from means-to-an-end to ends-in-themselves. There is no reason why biological uniformities of this type have to be confined to the study of biological phenomena. It has to be said that many practitioners of a functional approach are as confused about this distinction -- between means and end, methods and objectives, methodological and substantive uniformities -- as are their critics.

At this point an interesting question occurs about the study of human behaviour. Are there social and psychological uniformities with the same methodological status as the physical, chemical and biological ones discussed above? Here we are in something of a dilemma, because we know (or think we know) that these features of human behaviour are variable. Yet there is one such widely proposed uniformity, and that is the structuraliste (in the French sense) assertion of uniformity in the way the human brain classifies the environment into binary opposites. It is interesting to note in passing that, like the functional uniformities cited earlier, this structuraliste uniformity is often criticised as a statement of the obvious. However, when this supposed uniformity is applied to the archaeological record, it is not entirely clear whether it is being used as a methodological uniformity, in which case one has to ask what other phenomena it brings within the scope of empirical enquiry, or whether it is being proposed as a substantive uniformity, in which case one is forced to ask what other methods are available to provide an independent evaluation of it⁵.

In short I regard methodological uniformities as an acceptable -- indeed indispensable -- means to observation of the archaeological past. But acceptance of the method does not require belief in the substantive version of uniformitarianism.

Difficulties with Time Perspectivism

What, then, of the barriers to an acceptance of time perspectivism? Here, too, there are four main difficulties. First of all there is the sub-disciplinary specialisation and compartmentalisation within archaeology, which tends to obscure the need to think about the effect of different time scales. Palaeolithic archaeologists, for example, are not well known for being familiar with what is involved in a study of post-medieval archaeology, except at a superficial or a purely technical level, and vice versa. If they were, the problems of relating concepts to appropriate time scales would be more apparent, and the need to investigate their interactions felt more acutely. To some extent these

internal barriers within the discipline are beginning to break down with the growth of interest in archaeological theory and the aspiration of universal applicability. However, much of what passes for substantive theory in archaeology simply represents a projection to the universal of factors which in reality have a much more restricted scope of application derived from a limited time perspective.

A second difficulty is that we intuitively resist the notion of moving our perspective in time, partly for egocentric reasons, but also because we know that it is physically impossible to travel through time. The notion that we can at least in imagination change our time perspective is a difficult one, even though it involves no greater effort of imagination in principle than that required to view ourselves as individuals from someone else's point of view, or to view a point in space from a different spatial perspective.

A third difficulty with time perspectivism is that, in seeking a certain detachment from the present, it can be accused of claiming a sort of objectivity of knowledge through study of the past that is denied to studies of the present. However, this search for detachment should not be mistaken for an assumption of objectivity in the sense of superior or absolute knowledge. We can never fully escape the influence of our own historical era. If allocentric concepts of the past seem like an attempt to achieve a Martian's eye view of human history, we should remember that even Martians would presumably interpret our world in the light of subjective notions derived from experience of their own world. The argument calls for diversity of perspectives rather than for the superiority of one over others -- for challenging the priority and uniqueness of the present era and the superiority of the present time perspective, rather than asserting it without question.

A final problem with time perspectivism is that it is often perceived as implying some degree of determinism or reductionism, and a denial of human creativity and individuality. If there are larger-scale processes which operate to some extent independently of the small-scale activities of our daily lives, must we not then suppose that we are in the grip of powerful long-term forces over which we have no control, and which can override smaller-scale processes? The objection to time perspectivism here is complementary to one of the objections to substantive uniformitarianism: whereas it can be objected that the latter asserts the priority of the present over the past, and thus seems to deny any creativity or intellectual role to prehistoric archaeologists, time perspectivism seems to redress the balance too far in the other direction, claiming the priority of long-term processes over short-term ones, thus denying any creativity or importance to past (or present-day) people. This impression is reinforced by an emphasis, especially by those who work on the longer time spans of the earlier archaeological record, on biological and environmental factors. This is often accompanied by inattention to social variables, sometimes explicit dismissal of them as short-term 'noise', and by an impression that behavioural processes of the longer-term record are essentially asocial.

This emphasis on biological and environmental factors is related to two points already discussed: firstly, that these are often the most reliable source of methodological uniformities with which to observe past behaviour; secondly, that they respond to changes in the major variables operative over the longer time spans of the Pleistocene record, and need therefore to be brought into the picture. However, this emphasis can easily be misread as a denial of the social. Conversely the objection to much of the 'social archaeology' that is imported into earlier archaeological interpretation, as I see it, is that the social factors are often not specified except in the vaguest terms, to demonstrate allegiance to a belief in human individuality and creativity, as if this notion were under threat. Or else the social processes proposed are small-scale interactions simply extrapolated directly from the anthropological and sociological record of the recent past and exhibiting all the worst difficulties of substantive uniformitarianism. The result has been a direct confrontation, often entertaining but ultimately fruitless and distracting, between dogmas of the social and the ideational on the one side, and of the environmental and the biological on the other, which continues to reverberate in the archaeological literature⁶. The important question is not whether social factors are present or absent in the long-term record, but what sort of social concepts are appropriate at this scale, and in what ways they interact, if at all, with the demographic, economic, environmental and biological variables that manifestly dominate the field of view at larger scales of focus. This matter deserves more serious thought from archaeologists than it has thus far received.

An important tenet of time perspectivism, in any case, is that processes observable at one scale cannot be reduced to, or deduced from, processes at another scale. For example, the large-scale motions of the earth's tectonic plates are not the outcome of small-scale stream processes of erosion and sedimentation extrapolated over very long time spans. Nor are stream processes deducible from, or epiphenomenal to, tectonic motions. The two sets of phenomena operate on such vastly different geographical and temporal scales that they seem to be largely independent of each other, although they may sometimes interact in a zone of temporal and geographical overlap, for example where rivers flowing over a fault zone have their profiles distorted by repeated earthquake movement. Similar questions of interaction or independence arise in discussions of human behaviour, for example in the relationship between individual action and social norms, or in the relationship between social behaviour and biological or environmental constraints. Reproductive decisions, for example, are at one level socially determined, but at a larger scale other factors must be taken into consideration to understand demographic trends. The problem, then, is to identify the different scales of processes, how, if at all, they interact, and what that degree of interaction or independence tells us about more fundamental principles. If the non-human sciences are any guide, interaction seems to occur either between processes with similar or overlapping temporal scales of operation, or between vastly dissimilar scales of phenomena, for example between the expansion of galaxies and the behaviour of sub-atomic particles, between movements of

the earth's crust and the mechanical properties of solid compounds, between phylogenetic evolution and the behaviour of the genome, and perhaps in the human sciences, between the cultural and social developments of the Quaternary period and the workings of the brain.

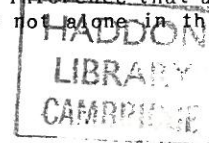
Conclusion

The reasons for preferring a time perspectivist approach can be summarised as follows. It gives to archaeological study of the past a sense of autonomy and purpose, and avoids the sense of inadequacy which pervades the discipline in its tendency to defer to the authority of other disciplines, to borrow, often superficially, the contents of their textbooks, to acquiesce in accusations of methodological inferiority, or to take refuge in technical mysteries. Secondly, it offers the possibility of placing some sort of check on our egohistorical notions of our own uniqueness and importance, and of putting these into an alternative perspective. Finally, it should be noted that other disciplines are beginning to explore time-scaling effects within their own limits, for example sociology (Giddens 1981), geography (Holly 1978), and ecology (O'Neill *et al.* 1986), though the range of time scales that they can encompass is necessarily rather restricted. Archaeology covers a much larger span of time and a much greater range of time scales than any other human science, and is best placed to explore the interactions between the full range of phenomena that impinge on and constitute the various processes that are loosely lumped together by such phrases as 'human behaviour' and 'human history'. Precisely what phenomena are observed at different time scales and how they are to be related is the fundamental problem, and one which only archaeologists are in a position fully to address. If we face up to that challenge, we may ultimately say something useful and novel about ourselves as humans which will make a genuine contribution to the growth of collective self-knowledge. First, however, we shall have to break the time barrier imposed by our limited temporal horizons, and break free from the flat, two-dimensional, single-scaled view of the past which has dominated our intellectual tradition until now.

Notes

1. Since some of my previous statements on this issue have been misinterpreted (e.g. Head 1986) to mean that I actually advocate substantive uniformitarianism, I should emphasise that my comments here are statements of what follows logically from the substantive uniformitarian position, not a statement of my personal preferences. It should also be clear that, in attacking substantive uniformitarianism, I am not attacking the search for universal principles, but the assumption that archaeological study of the past can have nothing to contribute to such a search.

2. My point here is not that the problems of inference discussed under these various labels are irrelevant or unimportant, rather that they are not different in principle from the problems of inference that affect all observational disciplines. Archaeologists are not alone in thinking



that their discipline suffers from peculiarly difficult methodological obstacles. My objection to the labels is that they suggest something peculiar and slightly mysterious about archaeological inference. They also distract from the discussion of substantive issues and run the risk of encouraging an inductive frame of mind in which archaeologists may come to believe that, if only they clean up their methodological act and refine the data, this will somehow solve all problems of interpretation.

3. The term 'perspectivism' is not entirely satisfactory. In the philosophical literature, especially in the work of Ortega y Gasset (1914), it refers to a relativist thesis in which each individual's point of view, or perspective, is treated as equally true and unique, so that the only ultimate reality is the self and the circumstances of the individual's life. A similar idea is found in some of the writings of Nietzsche, and leads on to the Frankfurt School and to social philosophies embraced with enthusiasm by archaeologists opposed to 'positivism', 'scientific method', separation of facts from values, and the like. This leads in a rather different direction from the sort of temporal relativism discussed here. I have referred elsewhere to hierarchical causation, but the introduction of this concept implies that some levels within a hierarchy are more important than others, and I wish to avoid that prejudgement at this stage. In so far as labels are necessary I prefer time perspectivism to the alternatives.

4. There are at least two theoretical components to observation: theories which underpin observational methods; and theories which guide the choice of problem and provide the source of explanation for what is observed. The essential feature of scientific method is that these two components should be independent of each other. The method does not determine what phenomena are studied, nor does it guarantee certainty (for the observational theories may be wrong); even less does it guarantee some sort of absolute knowledge.

5. The question of where Ian Hodder's symbolic and post-processual approach to archaeological interpretation would fit into this discussion is difficult to decide at present. The approach is evolving so rapidly and the formulations change so often that it is doubtful whether a sufficiently stable conceptual configuration has yet emerged to allow assessment. By asserting that material culture is as much a direct expression of behaviour as, say, speech, social interaction or other forms of activity (rather than an imperfect material byproduct of such activities), the approach seems to avoid some of the worst methodological difficulties of substantive uniformitarianism and to bring a great deal of otherwise intractable archaeological data within the scope of direct empirical investigation. On the other hand, the assertion that we can only interpret past behaviour to the extent that we assume that past peoples conceptualised their world in much the same sort of way that we do ours, is obviously vulnerable to the charge of circular reasoning, while the emphasis on small-scale social interactions is equally vulnerable to the charge of an extreme substantive uniformitarianism. It is certainly significant that almost all those

students who have pursued such an approach with any success so far have confined their attentions to case studies in the ethnographic present or the recent historical past.

6. The polarity creates another misleading boundary, like that between 'past' and 'present', which proves difficult to define on closer inspection. Studies of palaeoeconomy are often placed on the environmental side of the boundary, but in fact they cut right across it, or should do so, whence lies their interest.

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CHRONOS AND THE ORACLE:
SOME THOUGHTS ON TIME, TIMESCALES AND SIMULATION

James McGlade

Introduction

Simulation in archaeology was something of a growth industry in the 1970s as computer facilities became more generally available and in response to a seminal article by Doran (1970). A wide variety of modelling exercises was undertaken, spurred mainly by geographic exemplars, which resulted in a number of spatial studies documenting, for example, artefact dispersal and settlement evolution. The growing popularity and predictive potential claimed for simulation, evident in Ian Hodder's (1978) edited volume, arguably reached a high-water mark with the publication of the School of American Research Advanced Seminar on systems models and simulation (Sabloff 1981).

As a by-product of the quantitative shift ushered in by the "new archaeology", simulation was seen as part of a growing corpus of methodological advances: mathematical rigour was to be the harbinger of a new set of explanatory models, and an end to inductive, descriptive techniques. The inadequacy of these latter 'normative' procedures was crystallised in Binford's (1972) exhortations for the adoption of an alternative systemic and evolutionary perspective, and it was primarily this emphasis which provided substantial impetus for the widespread adoption of simulation modelling in archaeology.

Not surprisingly, the rigidity and narrow positivist orientation of this paradigm rendered its application to complex social situations problematic and stimulated an ongoing debate concerning the inability of systems thinking to offer a 'meaningful' contribution to the interpretation of structure, meaning and individual action within culture process (Godelier 1977; Friedman and Rowlands 1978; Giddens 1979; Tilley 1981; Hodder 1982, 1986).

Thus, in spite of the substantial intellectual effort invested in simulation studies, we are faced with the uncomfortable prospect that, from a methodological and theoretical standpoint, simulation has failed: at least in its much heralded ability to render the complex questions of culture process more tractable. This is less a criticism of the generation of simpler models designed for heuristic purposes, but rather is directed at the larger multicomponent modelling enterprises, such as those concerned with the simulation of culture change.

This article suggests that the failure to 'deliver the goods' is in large part a consequence of inappropriate and flawed modelling procedures employed by archaeologists; more seriously it represents an