

## **Archaeology: the loss of innocence**

**by David Clarke**

*We published last year two articles dealing with the aims and relevance of the so-called 'new archaeology': the first was by Professor Richard Watson (1972, 210-15) and the second by A. C. Hogarth (1972, 301-4). We also published a review by David Clarke of 'Explanation in archaeology' by P. J. Watson, S. A. LeBlanc and C. L. Redman (1972, 237-9). Here, Dr David Clarke, Fellow and Tutor of Peterhouse, Cambridge, sets out his considered views on the name and nature of archaeology, some of which he has already discussed in his book 'Analytical archaeology'.*

The loss of disciplinary innocence is the price of expanding consciousness; certainly the price is high but the loss is irreversible and the prize substantial.

Although the loss of disciplinary innocence is a continuous process we can nevertheless distinguish significant thresholds in the transitions from *consciousness* through *self-consciousness* to *critical self-consciousness* and beyond. Consciousness is perhaps achieved when the discipline is named and largely defined by specifying its raw material and by pragmatic practice - archaeology is what archaeologists do. Thenceforth, the practitioners are linked within an arbitrary but common partition of reality, sharing intuitive procedures and tacit understandings whilst teaching by imitation and correction in the craft style (Alexander, 1964, 1-60).

Gradually *consciousness* develops into *self-consciousness* and sophistication erodes the paradigms of innocence. Self-consciousness dawns with explicit attempts at self-knowledge - the contentious efforts to cope with the growing quantity of archaeological observations by explicit but debated procedures and the querulous definition of concepts and classifications. The discipline emerges as a restless body of observations upon particular classes of data, between a certain range of scales, held together by a network of changing methodology and implicit theory. Teaching, now formalized in academies and universities, attempts to condense experience within general principles and explicit rules; it is no longer possible either to teach or to learn the vast body of data and complex procedures by rote. Instead, classes of data and approaches are treated in terms of alternative models and rival paradigms; inevitably, the comparison of classes introduces counting and measuring which in turn entails a modest amount of mathematical and statistical methods and concepts.

This process is also marked by the emergence of competitive individualism and authority, since the individual's living depends on the reputation he achieves as a focus in the media or by innovation and intensive work in a specialist field. The politics and sociology of the disciplinary environment increasingly develop this 'authoritarian' state in which each expert has a specialist territory such that criticisms of territorial observations are treated as attacks upon personalities. This gradually becomes a seriously counterproductive vestige of a formerly valuable disciplinary adaptation by means of which authorities mutually repelled one another into dispersed territories, thus effectively deploying the few specialists over the growing body of data.

So, the new sophisticates industriously sub-partition their discipline; each group deepens their specialist cells by concentrated research, thereby unconsciously raising barriers to communication between archaeologists within the expanding mass of period, regional, topic, methodology and paradigm cells. These individual cells are clustered within and crosscut larger regional partitions based on the convergent involvement of localized groups of men with the same regionally peculiar range of archaeological phenomena within a common national, linguistic and educational environment increasingly separating themselves from other groups of archaeologists confronting the same range of phenomena but not in the same particular form or national context. Self-conscious archaeology has become a series of divergent and self-referencing regional schools with cumulatively self-reinforcing archaeological education systems and with regionally esteemed bodies of archaeological theory and locally preferred forms of description, interpretation and explanation, where the political and sociological characteristics of individualism and authority complement the narrow specializations within divergent academic traditions. The prevailing feeling is 'look how much we know' and the general impression is that the discipline hardly exists as one subject at all.

These unsatisfactory developments culminate in the emergence of a new level of disciplinary consciousness, *critical self-consciousness*, in which attempts are made to control the direction and destiny of the system by a closer understanding of its internal structure and the potential of the external environment. Focus switches from the heap of data to the vast sample space and the prevailing feeling is now 'look how little we know and how inappropriate are our models and explanations'. The general impression moves towards the position that archaeologists hold most of their problems in common and share large areas of general theory within a single discipline with regional manifestations. If the first revolution from consciousness to

self-consciousness is mainly technical then this second threshold is largely a philosophical, metaphysical and theoretical one brought upon us by the consequences of the first (Clarke 1970, 27; 1972b, 7-10).

In the new era of critical self-consciousness the discipline recognizes that its domain is as much defined by the characteristic forms of its reasoning, the intrinsic nature of its knowledge and information, and its competing theories of concepts and their relationships - as by the elementary specification of raw material, scale of study, and methodology. Explanation, interpretation, concepts and theory become central topics of debate and develop the essential significance of archaeological logic, epistemology and metaphysics. It is apparent that archaeologists need to know about knowing and the limits of what they can and cannot know from the data and to know this by critical appraisal, not simply by assertion. Demoralizing but fundamental questioning develops given what we now know about the limitations of the data, concepts and methods, how do we know what we appear to know reliably? Given that many explanations, models and theories may all be simultaneously appropriate at many different levels and in different contexts, how do we choose between them? The astringent scrutiny of articles of faith and the burden of choice indeed represent an ordeal by fire - a painful refinement in the critical flame.

The needs of teaching emerge as one of the main disciplinary propellants into the space of expanding consciousness - student and amateur provide the fuel, research sparks ignition and the disciplinary elders monitor and direct in a series of contradictory instructions. A new environment develops as students and amateurs of an ever-widening background emerge in increasing numbers and archaeological units of all kinds multiply outside as well as inside the old Euro-American centres. From the Antipodes to Africa the old regionally self-centred 'colonial' concepts are severely challenged and their weaknesses gravely exposed in the wider general debate. Question leads to unrest, freedom to further self-consciousness and thought about thought, as the unformulated precepts of limited academic traditions give way to clearly formulated concepts whose very formulation leads to further criticism and more debate (Alexander, 1964, 58). The rate of change becomes as disconcerting as the uncertainty, insecurity and general unrest - no-one can deny the high price of expanding consciousness.

It is as unrealistic to ignore this contemporary context of debate as it is to portray these changes as painless moves from historic ignorance to archaeological enlightenment; each archaeology is of its time but since many deplore the time they will certainly be unhappy with its archaeology. The disciplinary system is after all an adaptive one, related internally to its changing content and externally to the spirit of the times. Past archaeological states were appropriate for past archaeological contexts, and past explanations were very much related to past archaeological states of knowledge (e.g. short chronologies) and our own are no better in these respects. However, formerly adaptive qualities frequently become disadvantageous vices in new environments and if archaeological development is not too closely to resemble genetic ageing, with its dramatic terminus, then there has to be a critical and continuous monitoring process to regulate development. Otherwise there is an accumulation of errors and a build-up of multiple failures which would demand a simultaneous spasmodic correction of global proportions. In the extreme case, formerly adaptive, traditional archaeological positions can evolve in the new environment into monofocal, monodimensional and myopic specialization, conformist authoritarianism, academic regionalism and individualism, archaeological isolationism and chauvinism; the attributes of a doomed race of disciplinary dinosaurs.

### **The New Environment**

The transition of archaeology from noble innocence to self-consciousness and critical self-consciousness has been artificially condensed within such a spasm of an unusually abrupt and severe kind. Historical and technological developments have coincided in a remarkably rapid change in disciplinary environment and content in the decades following World War II, compressing these phases of transition within the span of a working life-time, from the 1950s to the 1970s. The World War itself was not without significance in this social and scientific revolution. Externally, neighbouring disciplines were transformed by interrelated spasms which erupted in the New Mathematics, New Biology, New Geology, New Geography, New Social Studies, and the New Architecture. Internally, the number and variety of archaeological amateurs, students, teaching-staff, university departments, research units and excavations have globally doubled or trebled in comparison with the 1930s. Simultaneously, the major technical developments of wartime introduced fresh archaeological potential, ranging from heavy mechanical excavators to new underwater and aerial equipment, through applied mathematics to operational research, computer electronics and atomic physics. A quantitative and qualitative technical and social revolution quietly transformed world archaeology in a series of almost imperceptible piecemeal changes.

These crucial decades have seen not only the emergence of new men, new methods and new equipment but more men, methods and equipment in a greater variety than ever before. New observations, new ideologies, new philosophies and therefore new aims uncomfortably jostle earlier ones - the new scepticism, uncertainty and insecurity painfully chafe the traditional security of innocence and the comforting confidence of habitual operations.

Many archaeologists will be unwilling to face the challenge of the new situation and may either entrench themselves in traditional positions or retreat within the logically impervious bastion of the freely creative artist. However, although these reactions are understandable they are based upon two quite mistaken beliefs; that we can indefinitely avoid the challenge of new conditions by returning to primitive paradigms; and that the deployment of artistry and imaginative creativity have no place amongst the new materials and new approaches. By retreating within traditional forms it is always possible to alleviate

but never to banish the fresh burden of new decisions (Alexander, 1964, 10-60). A new environment develops new materials and new methods with new consequences, which demand new philosophies, new solutions and new perspectives.

### **New Methodology**

Old methods have not only been extended in new ways but a huge range of new methodology has sprung up which either extends our archaeological senses by detecting more, different and previously unknown data attributes, or extends our capacity for information recovery, manipulation and analysis. A new field methodology has emerged with new techniques for site location, combining aerial reconnaissance with a range of resistivity, magnetometer, gradiometer, electrolocation and chemical location methods. New large-scale techniques with heavy machinery for area excavation are complemented by small-scale techniques for the processing and analysis of sites and deposits - photogrammetry, fine sieving, flotation, centrifuging - which provide data of a kind previously unknown. Physical, chemical and botanical techniques amplify our information about the sources, properties and movements of organic remains, fauna, flora, stones, clays, pottery, glass, resins and metals - using chromatography, thin section methods, heavy mineral analyses, optical and electron microscopy, electron microprobes, optical emission spectrometry, infra-red spectroscopy, X-ray fluorescence, diffraction and microanalysis, beta-ray back scatter, neutron activation techniques, and many others.

Archaeological scales for measuring and counting, the key to comparative analysis, have been transformed. Chronological measurement has been reformed by the many isotope methods, thermoluminescence, fission track, archaeomagnetic, hydration, volcanic tephrochronology, fluorine/nitrogen and many comparable developments - with profound consequences. Measures and counts now abound in a field traditionally devoid of comparative scales - taxonometrics, ethnometrics, energetics, thermodynamics, information indices of structural complexity, economic measures of utility, spatial measures of distribution (Clarke, 1972b, 53). The proper treatment of qualitative and quantitative observations has introduced a welcome precision and a proper appreciation of error, facilitated the testing of predictions and, above all, such measurement structures have revealed new empirical relationships and generated fresh theory - new problems.

The realization has also dawned in archaeology that mathematical methodology, a massive field in itself, provides many new possibilities. The appreciation that these methods are languages of expression and deal as much with order and relationships as magnitudes has introduced almost every branch of mathematics into archaeological contexts - from mathematical logic, to axiomatics, set and group theory, vectors, topology, probability, statistics, boolean algebra, matrix algebra, n-space geometry, numerical taxonomy, error and confidence estimates, combinatorics, linear programming, game theory, optimization methods, location-allocation techniques and many more (Clarke, 1968; Gardin, 1970; Kolchina and Shera, 1970; Hodson, Kendall and Tautu, 1971).

These reinforcing developments in excavation, analysis, measurement and manipulative machinery give added scope to the two other major fields of methodological innovation - explicit model-using and experimentation, and the comprehensive theory of systems and cybernetics (Clarke, 1972b, 29-44).

Nevertheless, even amongst this explosive variety of new methodology two developments have emerged with repercussions which potentially dwarf the others - computer methodology and isotope chronology.

Computer methodology provides an expanding armoury of analog and digital techniques for computation, experimentation, simulation, visual display and graphic analysis. These sense-extending machine tools can either be used like the microscope to examine the fine structure of low-level entities and processes in minute detail, or like the telescope to scrutinize massive ensembles over vast scales. They also provide powerful hammer-and-anvil procedures to beat out archaeological theory from intransigent data - thus on one hand these methods can be used to construct models and simulate their consequences over a range of states, identifying test-conditions - on the other hand the computer may be used to analyse and test real data and measure our expectations under the model against the reality.

Whilst all thinking archaeologists must share severe reservations about what has *yet* been achieved with the aid of these tools, the fault is with the uncertain archaeologist and his shaky concepts, not with the machine; the new generation of archaeological craftsmen have yet to master the potential of the new tool. Indeed, a major embarrassment of the computer has been that it has enabled us to do explicitly things which we had always claimed to do intuitively - in so many cases it is now painfully clear that we were not only deceived by the intuitions of innocence but that many of the things we wished to do could not be done or were not worth doing and many unimagined things *can* be done; we must abandon some objectives and approach others in different ways. Harnessing powerful new methodological horses to rickety old conceptual carts has proved to be a powerful but drastic way of improving archaeological theoretical constructs by elimination.

The chronological consequences of isotope and other dating methods, especially the Carbon-14, Potassium-Argon, and Uranium series techniques, have infiltrated archaeological thinking in a manner which has largely concealed the significance of their repercussions. It has become increasingly apparent that the archaeologist must now think directly in terms of the kinked and distorted time surfaces of the chronometric scales which he actually uses - Carbon-14 time, Potassium-Argon time, and typological time - where the error factors are almost more important than the scale graduations. In another aspect,

the transformation of archaeological time from ultra-short to very long chronologies has had unsuspected and little-discussed consequences for archaeological metaphysics, entity concepts, processes and explanations.

Under the ultra-short chronologies, archaeological time was confused with historical time and seemed packed with data and events; large-scale phenomena appeared to take place in swift interludes - hence the prevalence of 'invasion' explanations. This situation is precisely equivalent to that underlying the 'catastrophe' theories of 18th-century geology and we should note the connexion between time scale, explanation and theory, since it is now exceedingly doubtful that the archaeologist can continue to use the old stock of political, historical and ethnic explanatory models in this direct way. Thus, to interpret the French Mousterian sequence, of more than 30,000 years duration, in terms of the acrobatic manoeuvrings of five typological tribes is tantamount to an attempt to explain the Vietnam war in terms of electron displacements. Political, historical and ethnic entities and processes of these kinds cannot yet be perceived at that scale in that data, even if they then existed and even with our latest sense-extension and detection devices.

A fundamental lesson emerges - the *consequences* arising from the introduction of new methodologies are of far greater significance than the new introductions themselves. We must move from the traditional model of archaeological knowledge as a Gruyère cheese with holes in it to that of a sparse suspension of information particles of varying size, not even randomly distributed in archaeological space and time. The first thing we may deduce from this revision is that many of our taxonomic entity divisions are defined by lines drawn through gaps in the evidence and zones of greatest ignorance; this does not make these taxa invalid but it does gravely alter what constitutes meaningful manipulation and explanation of such entities. Now although these problems become less severe with later material they tend to become more subtle and they never entirely disappear. We must face the fact that although they may with care be mapped on to other disciplinary domains, archaeological observations, entities, processes and explanations remain archaeological animals and they are all scale, context, sample, paradigm and ultimately metaphysics dependent.

The huge content of the new and newly extended methodologies is self-evident. However, it has not been sufficiently grasped that, numerous as they are, these methods form only one new component in the new environment and that they are less important in their own right than the new information they provide and its cumulative intellectual consequences. Certainly new ancillary methods do not alter the intrinsic nature of the discipline and we must not suppose that because we can display an archaeological relationship mathematically and analyse archaeological data scientifically that the discipline itself necessarily assumes a mathematical or scientific status. But equally neither may we assume that, because we describe archaeological observations in a literary form and interpret our data imaginatively, the discipline is a free creative art (Clarke, 1968, 635, 663; 1972b, 18).

### **New Observations**

The array of new and old methodologies have also combined over the same twenty years to produce a multitude of 'surprising' new observations and to detect previously unrecognized sources of variability. Only the adaptive stability of the highly cellular structure of traditional archaeology has successfully disguised and dissipated what might have been a fundamental shock to the entire system by confining each disconformity to a localized compartment. However, effectiveness cannot be indefinitely sacrificed to stability, and archaeological explanations, models and theories have yet to accommodate - a broad area and multilinear origin for tool-using hominids spanning more than 2,600,000 years, man in Australia and America before 25,000 BC, Japanese ceramics by 8000 BC, Southeast Asian food production before 6000 BC, and bronze technology by 2500 BC, radiocarbon. Once again, epistemological adaptation to the empirical content of the new observations is of no less significance than the explanatory and conceptual adaptation now required to understand them. Even those most complete and finished accomplishments of the old edifice - the explanations of the development of modern man, domestication, metallurgy, urbanization and civilization - may in perspective emerge as semantic snares and metaphysical mirages.

### **New Paradigms**

In this information explosion it is hardly surprising that groups of practitioners have broken free from traditional conformity and realigned themselves around the study of the special problems of limited dimensions of the new evidence. Although their roots are old, we suddenly have a number of vigorous, productive and competitive new paradigms which have condensed around the morphological, anthropological, ecological and geographical aspects of archaeological data (Clarke, 1972b, 6-53). Nevertheless, diverse though they may be, they are significantly international and share much of the new methodology, philosophy and experimental ideology.

A temporary new sectarianism may be the price for the dissolution of the old disciplinary fabric but this anarchic exploitation of freedom is symptomatic of the rethinking of primary issues. It is now at least refreshing to find archaeologists of one specialist interest, one regional school and one ideology making major if controversial contributions in other archaeological specialisms and fields; cellular isolation is no longer possible even were it desirable.

### **New Philosophies**

The threshold of critical disciplinary self-consciousness is currently being traversed as the inevitable consequence of the social and technical revolution in archaeology. The old disciplinary system could not indefinitely contain, suppress, or accommodate the accumulation of discordant new information within its structure, so the system has adapted by exploring a range of new philosophies and ideologies from which will slowly emerge, after due debate, those most capable of accommodating both the old and the new information and aspirations compatibly.

The new ideologies and philosophies therefore present no simple new orthodoxy but heterodox diversity; the strength of the new archaeologies, or New Archaeology, is that it introduces a variety of questions where only answers were formerly proclaimed and disciplinary exhaustion a certitude. The era of critical self-consciousness has therefore dawned with the explicit scrutiny of the philosophical assumptions which underpin and constrain every aspect of archaeological reasoning, knowledge and concepts; some of the possible developments of these aspects will be touched upon below (New Consequences).

### **The New Archaeology**

Do these developments represent a 'New Archaeology'? Well of course it depends on the point of view of the observer and what the observer wishes to see. However, it does seem difficult to sustain the view that the character, scale and rapidity of recent change is of no greater significance than that experienced in other twenty-year spans of archaeological development. We seem rather to have witnessed an interconnected series of dramatic, intersecting and international developments which together may be taken to define new archaeologies within a New Archaeology; whether we choose to use these terms or avoid them is then mainly a personal, political and semantic decision.

We can define a postwar quantitative and qualitative revolution in the numbers and variety of archaeological amateurs, students, departments, excavations, equipment and methods. At first, it seemed these were merely numerical and technical changes which could easily be assimilated. However, the new methods produced new observations and fresh potential which could not be reconciled with the existing disciplinary system. New paradigms emerged as a response to this situation and now new ideologies and philosophies are being developed to reset the new archaeological information within an appropriate disciplinary frame and metaphysical field space.

The New Archaeology is an interpenetrating set of new methods, new observations, new paradigms, new philosophies and new ideologies within a new environment. It is not virtuous simply because it is new; many elements are unsound, inaccurate or wrong but that is equally true of much of traditional archaeology. Nevertheless, some of the new developments are unassailable and all of them are explicit, experimental attempts to grapple with, rather than avoid, the fundamental problems of archaeology; a critical self-consciousness which healthily extends to self-critical self-consciousness, the new archaeology monitoring and controlling the new archaeology (LeRoy Johnson, 1972, 374).

The financial and intellectual cost of these developments is severe and interposes rather subtle dangers. Traditional confidence and habitual disciplinary security crumble into the insecurity of critical self-consciousness and professional uncertainty, posing the heavy burden of choice within a vastly enlarged conceptual arena. Authority seems challenged by anarchy as familiar concepts collapse under testing, traditional guidelines dissolve and decisions become more difficult. New questions are asked but not always answered. Disreputable old battles, long fought and long decided in other disciplines, are imported into archaeology to be needlessly refought with fresh bloodletting. Even the new methods subtly threaten to redefine our basic concepts, entities and processes for us; sometimes for the better, sometimes for the worse, emphasizing the essential need for clear logical, epistemological and metaphysical control of archaeology by archaeologists - the price of freedom is eternal vigilance (Clarke, 1972a).

### **The New Consequences**

#### **Theory of Concepts**

It has become clear that every archaeologist has thoughtfully or unthinkingly chosen to use concepts of a certain kind - thus committing himself to a metaphysical position, restricting himself to certain paradigms, to use certain methodologies, to accept certain modes of explanation and to pursue certain aims; at the same time explicitly or tacitly rejecting other metaphysical positions, paradigms, methods, explanations and aims. In each era archaeologists represent the temporary state of their disciplinary knowledge by a metaphysical theory which presents appropriate ideals of explanation and procedure. But metaphysical systems are not systems of observations but invented systems of concepts without which we cannot think (Harré, 1972, 100-39).

Archaeological metaphysics is the study and evaluation of the most general categories and concepts within which archaeologists think; a task long overdue (Clarke, 1972a). Unknowing devotion to one metaphysical system prevents the recognition of those of other archaeologists, and critical self-awareness is therefore the first step to the comprehension of the position of others and the bursting of the bonds tied by one's own metaphysical assumptions. Metaphysical systems may be

invented ensembles and the archaeologist may be free to choose according to whim, since the choices are not between right and wrong; but judgement can still be exercised in terms of the validity of the concepts selected, the appropriateness of the ensuing explanation for the scale of concept selected and then the adequacy and power of that explanation thereafter.

This approach reveals that archaeologists, old and new, have adopted many quite different analytical concepts. The 'historical' school have preferred the imagined historical individual, or group of individuals, acting at the personal scale within events of a comparable level; appropriate explanation has therefore been in terms of the states and reasons attributed to these actors laid out in rational and dispositional explanations. The 'physical' school have preferred models ranging in scale from particle clouds to networks and billiard balls, thus diversifying causal and probabilistic explanations from diffusion waves in media, to systemic interaction and invasive displacement. It is amusing to note that just as 'invasion' explanations were conditioned by the metaphysics of the short chronologies and produced a reaction towards 'autonomous' explanations, so 'autonomous' explanations become meaningless amongst networked communities. Indeed the capacity of archaeology to reinvent for itself archaic explanation structures long abandoned in other fields is remarkable - invasion 'catastrophism' can be joined by the currently fashionable autonomous 'spontaneous generation' explanations and that mysterious 'phlogiston' civilization.

Archaeological entities, processes and explanations are bound by metaphysical concepts of time and space. So we may expect chronological and spatial revisions to be followed by profound disciplinary consequences. But, the very great importance of time and space measurement scales has often led the archaeologist to confuse the scales used for measurement with that which is being measured. Space and time are conceptual terms relative to the existence of complex phenomena; they exist because of the observed phenomena and not vice versa. Time and space are relative to some observed system, and a key step in archaeological interpretation is a model approach towards the meaning of time and space for the inmates of particular systems. The mobile Palaeolithic band moving on foot with limited external contacts and an extremely rapid generational turnover presents a very different time and space surface from the Iron Age society with elaborate transport, extensive international contacts and a slower generational turnover, even when occupying the same territory over a similar timespan. The measurement scale must not be confused with the relationships being measured and, in particular, forms of explanation should not be inappropriate to the error and graduation range of particular time and space scales.

The exposure of archaeological metaphysics to critical appraisal allows us the self-conscious capacity to consider the possibilities of altering or rejecting current disciplinary concepts in favour of some alternative forms. Thus, at the moment, archaeology is still a discipline in which artifacts, assemblages, sites and their contents are identified and related as relicts of communities in accordance with rules formulated in terms of artifact taxonomies - the traditional Montelian paradigm. But these artifact taxonomies are merely systems of a priori rules whereby the relation or identification of the archaeological configurations that are to bear taxonomic labels is guided and controlled by taxonomic postulates. So some practitioners within the ecological and geographical paradigms might suggest that we abandon artifact taxonomy as the primary system for organizing, classifying and naming archaeological entities and devise some other system of classification, perhaps in terms of landscape and activity units of some kind. Now, although there is a Neo-Montelian response to this suggestion, the main point is that fundamental speculation at this level is exceedingly important if only because the more fundamental the metaphysical controlling model, the less we are *normally* inclined to rethink it.

### **Theory of information**

The problems of information processing and nomenclature bring us into the field of archaeological epistemology - the theory of archaeological information (Clarke, 1972a). This will entail a critical and self-conscious concern with the kinds of information which archaeological methods might yield about the past, together with the limitations and obscurities imposed on the one hand by the nature of the record and on the other by our languages of expression.

Archaeologists have certainly failed to acknowledge the degree to which the nature of the archaeological record has imposed itself upon archaeological concepts. To a very large extent it now appears that many archaeological processes and groupings are 'artifacts' of the nature of the elements in the samples and their aberrant distributions - the nature of the entities arising in the main from the information characteristics of archaeological channels than from differing kinds of ethnic units, for example. This becomes readily apparent if we contrast the sparse density of Lower Palaeolithic finds in space and time with their few artifact categories and limited numbers of attributes severely constrained by function and material, against the abundant later finds of many categories in many materials, with large numbers of attributes and a great range of stylistic variability. It is hardly surprising that the Palaeolithic complexes which we 'detect' emerge as largely equifinal, functional groupings, many thousands of years deep and hundred of miles in radius - whilst the later units appear to be socially constrained stylistic groupings, several hundred years deep by tens of miles in diameter. The units we perceive are defined as much by the intrinsic limitations of the record as by the technology of perceiving.

Any consideration of 'Montelian' archaeological hypothetical entities - whether types, cultures, culture groups or varieties, traditions, cotraditions - introduces a number of epistemological problems. Whatever their status, we certainly use these theoretical terms to make reference and to relate observations. Now some hypothetical entities may prove to be real things, qualities, or processes and may be partially or completely demonstrated in due course (the 'virus' was just such a concept) but others are merely summarizing terms-of-convenience employed to simplify complex expressions (the mechanical concept of 'force' for example) (Harré, 1972, 91-9). Now archaeology has been much vexed by the problem of whether its hypothetical entities are 'real'; it had been intuitively assumed that they were so but the technical revolution which has allowed us to test

for their existence reveals that they are structurally very complex and their 'reality' is still a matter of debate. However, even should the *reality* of our hypothetical entities turn out to be of the latter merely referential form, their *utility* need not diminish. Although the Montelian paradigm was only a hypothetical mechanism which offered an account of the nature of archaeological data and explanations of its relationship to hominid behaviour, to be a Montelian under traditional archaeology was certainly to view this structure not just as a plausible model but as a reality. This is no longer possible or necessary and to be a Neo-Montelian within the new morphological paradigm is only to assume that it may still be a valuable way of thinking about the data (Clarke, 1972b, 6, 45).

This focuses attention upon a fundamental duality in archaeological data. Site, settlement and cemetery archaeology has recently and productively reasserted the special richness of the information which may be extracted from the complex, integrated relationships encapsulated within such sites. However, something approaching 95 per cent of the archaeological data that we have is not of this integrated form at all - it is disconnected, stray, collected, unprovenanced, pillaged or rescued material. Now, it was mainly for the purposes of extracting the maximum amount of useful information from this most abundant and very complex data, through comparative taxonomy, typology and distribution mapping, that the old hierarchies of archaeological entities were evolved.

Thus in practice we have two different but related dimensions of archaeological information which have to be reconciled and mutually exploited in an appropriate way. After all, since it is admitted that we will never be able to excavate the sites of a contemporaneous site system or, what is more to the point, given our chronological scales we would not be aware of the fact even if we had the luck to do so, it is apparent that what logically articulates sites within site system reconstructions is the repeated recurrence of sets of site categories and their mutual assemblage affinities. What allows us to speculate that in ninth-millennium BC Palestine there *may* already have existed complex site systems is that the concept 'Natufian' relates large supersites like Jericho, to villages like Beidha, hamlets like Nahal Oren and specialized hunting and fishing sites of many kinds, like Mugharet-el-Wad.

### **Theory of Reasoning**

Whether the last sentence expresses a reasonable speculation depends partly on the data, partly on the concepts and partly on the reasoning involved. The critical scrutiny of patterns of archaeological reasoning immediately exposes the basic importance of archaeological logic within archaeological philosophy and theory. Archaeological logic should outline for us the theory of correct reasoning within our discipline, without making any unwarranted assumptions that the principles of logic and explanation are simple universals which may be transferred from one discipline and level to another (Clarke, 1972a). These matters introduce the other side of the problems of 'explanation' and suggest why some reasoning may be appropriate at one scale, in one context, but inappropriate at another. It raises the problems of the nature of the logical relationships between archaeological conclusions and the grounds for those conclusions, between archaeological hypotheses and the reasons for their rejection or modification, the nature of predictions and postdictions and the dangers of correlations as explanations or causes of archaeological observations. The slippery nature of the logical aspects of archaeological explanation becomes apparent in the frequent confusions between the direct causes of archaeological observations and the explanation of the mechanism which brought about those causal stimuli at a yet deeper level. A proper scrutiny of such problems might allow archaeology to escape from the self-imposed paradoxes and tautologies which currently plague its arguments. Not the least interesting area in this respect would be some clear identification of the characteristics of 'pathological' explanations - those which are rejected and yet which appear to use normally acceptable reasoning on sound data.

At least part of the confusion about explanation in archaeology arises from the mistaken belief that there is one universal form of archaeological explanation structure appropriate at all levels, in all contexts. Attempts have been made to say something which would logically characterize all archaeological explanations but which simply succeed in describing, with varying success, certain modes of explanation used at certain scales, in certain contexts to answer certain archaeological questions. After all, the explanation of the recurrence of a certain house plan may have a logical structure of one kind, whilst the explanation of the collapse of the Maya or Mycenaean may have quite another; the explanation of complex events in sophisticated systems is an especially important and ill-understood area (Tuggle, Townsend & Riley, 1972, 8).

If archaeological explanations exist for many different purposes, and are of many different logical forms at varied levels in differing contexts, the appropriate procedures for judging and testing their accuracy, relevance and logical adequacy have yet to be explicitly uncovered; we must therefore resist an ill-fitting determination to force the patterns of archaeological reasoning within those supposed to hold for other disciplines (Clarke, 1972a). Nevertheless, we can anticipate some bases for such judgements. It has already emerged that one test of the relevance and adequacy of an archaeological explanation is the relevance and adequacy of its hypothetical elements. If the hypothetical is not relevant to the particular scale or context, as in the 'tribal' explanations of the Mousterian, then the explanation fails. Second, several different explanations may still compete for attention and here, amongst other criteria, it is the explanation which derives from or implies the existence of the more powerful *theory* which is to be preferred. At the last, even when an explanation is proven not to be trivial, tautologous, circular, redundant or statistically accidental it always remains 'conventional' - relative to the state of contemporary knowledge, a particular paradigm view and a given metaphysical position.

### **General theory**

One of the prizes denied to us by the partitioned regionalism and specialism of the Old Archaeology is the explicit realization that there is or could be a comprehensive archaeological general theory. The difficulty with this intriguing possibility has never been a lack of forms which this theory might take and areas within which it might fulminate but rather the converse - the infinity of kinds of theory which might conceivably be appropriate for archaeology and the familiar problem of choice, where to search in the infinity? An earlier response was either to import the Historicism of Spengler and Toynbee, the Determinism of Ellsworth Huntington, the modified Marxism of Childe and others, or to react by rejecting the possibility of general archaeological theory and to disappear into the depths of particular research problems with the rapidity of hot stones on snow.

Now, this prize may not yet be within our grasp but a possibly emerging theoretical form does now seem distantly perceivable. We have seen that the rising interest in archaeological philosophy naturally leads to necessary metaphysical theories of archaeological concepts, epistemological theories of archaeological information and classification and logical theories of archaeological reasoning. Here is certainly a body of necessary but unfulfilled theory which overlies and permeates a series of other levels of archaeological theory that translate and explain the relationships between classes of archaeological phenomena; it is these unspecified steps which underly the critical leaps in archaeological reasoning. Without such a body of theory these critical leaps do indeed take-off and become a free-flight of creative fancy - an irresponsible art form.

These other levels of archaeological theory may be crudely expressed as the steps latent in any archaeological interpretation, relating:

- (1) The range of hominid activity patterns and social and environmental processes which once existed, over a specified time and area.
- (2) The sample and traces of these (1) that were deposited at the time.
- (3) The sample of that sample (2) which survived to be recovered.
- (4) The sample of that sample (3) which was recovered by excavation or collection.

The pairwise relationships between these levels generates the essential set of predepositional, postdepositional, retrieval, analytical and interpretive models and theory which all archaeologists intuitively employ in the interpretive leaps from the excavated data to the written report, covering the interpretive process from the grave to publication.

*Predepositional and depositional theory* - covers the nature of the relationships between specified hominid activities, social patterns and environmental factors, one with another and with the sample and traces which were at the time deposited in the archaeological record; largely asocial, environmental and statistical theory relating behavioural variability to variability in the record, linking levels (1) and (2) above.

*Postdepositional theory* - the nature of the relationships between the sample and traces as initially deposited and their subsequent recycling, movement, disturbance, erosion, transformation or destruction; largely a micro-geomorphological and statistical theory linking (2) and (3).

*Retrieval theory* - the nature of the relationships between the surviving sample (3) and the characteristics of the excavation or collection process which selectively operated upon it to produce (4); largely a theory of sampling, field research design and flexible response strategies linking (3) and (4).

*Analytical theory* - the nature of the relationships between the observations (4), which become the data, and their subsequent operational treatment under selective modelling, testing, analysis, experimentation, storage and publication; largely a theory of information retrieval, selection, discarding, evaluation, compaction and decision costs, linking (4)-(1) via the interpretive theory.

*Interpretive theory* - the nature of the relationships between archaeological patterns established by analysis and verified by experiment, and predictions about the directly unobservable ancient behavioural and environmental patterns; largely a theory of prediction, explanation and model evaluation linking (4)-(1) by testing expectations derived by analogy against observations manipulated by analysis, given (2) (3) and (4).

These are, of course, not the only areas of archaeological theory but with archaeological metaphysical theory, epistemological theory and logical theory they clearly together constitute the nucleus of that theory - currently intuitive or unsatisfactory but gradually being specified - which makes archaeology the discipline it is and not merely the discipline of its operations, whether artistic, mathematic or scientific.

Certainly, part of archaeological theory, an important part of the predepositional and interpretive theories, may be reduced to social theory and might conversely be derived therefrom; emphasizing the great significance of social as well as environmental studies for the archaeologist. However, this is but a small part of archaeological theory and even in this restricted but important area the primitive terms and correlated concepts of social theory will require an appropriately specified transformation to conform with the space, time and sample characteristics of the equivalent archaeological data. The wider area of archaeological theory either treats relationships of a purely archaeological kind, or processes with space

and time scales for which there is no social terminology, or patterns which nowhere survive within the sample of recent human behaviour. Archaeology in essence then is the discipline with the theory and practice for the recovery of unobservable hominid behaviour patterns from indirect traces in bad samples.

### **The New Perspective**

In the later postwar decades (1950s-1970s) the boundaries of archaeological consciousness and potential receded with great suddenness. Not surprisingly, archaeologists have been left perplexed by this phenomenon and its uncertain consequences. They have a choice - to continue to operate within the limited field space of traditional archaeology, in which case the New Archaeology does not exist for them, or they can step outside their former habitat and meditate upon its unsatisfactory nature and problems which that system could not ask or answer. For there exists, mathematically and philosophically, a class of problems for any language system which cannot be explained in that system's current form and we therefore move to new languages and new disciplinary systems not only to answer former questions which could not be answered but also to abandon former questions and answers which had no meaning. Nevertheless, by the same proposition we can predict the transience of the New Archaeology itself - but we should not confuse transience with insignificance.

New Archaeology represents a precipitate, unplanned and unfinished exploration of new disciplinary field space, conducted with very varied success in an atmosphere of complete uncertainty. What at first appeared to be merely a period of technical re-equipment has produced profound practical, theoretical and philosophical problems to which the new archaeologies have responded with diverse new methods, new observations, new paradigms and new theory. However, unlike its parent, the New Archaeology is as yet a set of questions rather than a set of answers; when the questions are answered it too will be Old Archaeology.

The renewed concern with theory is refreshing after the furtive treatment that this crucial aspect widely received (except in the American school) after the scientism and historicism of the 1920s-30s. It re-emphasizes that such theory exists, in however unsatisfactory a form, in everything that an archaeologist does regardless of region, material, period and culture, although certainly requiring different particular values for particular problems. It is this pervasive, central and international aspect of archaeological theory, multiplied by its current weakness, which makes the whole issue of major importance in the further development of the discipline.

However, there are perhaps three groups of archaeologists who may be expected to be especially unwilling to welcome both the new developments and their theoretical consequences - amateurs, historical archaeologists, and practical excavators. The feeling that the vital and expanding corps of amateur archaeologists will be deflected by a new academic gulf is, however, largely a misconception based on a professional model of the amateur as an agricultural hayseed or a military buff; we risk forgetting that amateur archaeologists (the New Amateur?) embrace professions in laboratories, electronics industries, computerized business departments and technical factories and may have a better grasp of science, mathematics, computers and electronics than their temporary archaeological overlords.

For the archaeologist of later, text-aided and traditionally historically scaled periods the repercussions of the New Archaeology are more subtle than drastic. The new developments insist that the historical evidence be treated by the best methods of historical criticism and the archaeological evidence by the best archaeological treatment and not some selective conflation of both sets of evidence and their appropriate disciplines. The severe problems and tactical advantages which arise from integrating archaeological and historical evidence emerge as no more and no less than those arising between archaeological and physical, chemical, biological and geographical evidence. Indeed, work in text-aided contexts will increasingly provide vital experiments in which purely archaeological data may be controlled by documentary data, bearing in mind the inherent biases of both.

Finally, the practical excavator should appreciate more than any other archaeologist the degree to which his practice is controlled by his theoretical expectations, and these should accordingly be appropriate (Clarke, 1972b, 5-10). Thus with a more explicit theoretical awareness the practical excavator may contribute to a qualitative increase in understanding rather than simply a quantitative increase in data. In any case, practical men who believe themselves to be quite exempt from any intellectual influences are, as Lord Keynes pointed out, usually the unwitting slaves of some defunct theorist (Keynes, 1936, 383).

Archaeology is, after all, one discipline and that unity largely resides in the latent theory of archaeology - that disconnected bundle of inadequate subtheories which we must seek to formulate and structure within an articulated and comprehensive system; a common theoretical hat-rack for all our parochial hats.

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