

# *Time and Archaeology*



Edited by Tim Murray

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# TIME AND ARCHAEOLOGY

The concept of time is salient to all human affairs, and can be understood in a variety of different ways. Today, archaeologists are increasingly emphasizing time not only in their interpretation of the archaeological record, but also in the way our understanding of time plays a role in actually creating archaeological phenomena.

This pioneering collection is the first comprehensive survey of time and archaeology. It includes chapters from a broad, international range of contributors, combining theoretical and empirical material and illustrating and exploring the diversity of archaeological approaches to time. The contributors contrast a scientific understanding of time with social, cultural and religious ideas of time, and show how both are important to archaeology. While much archaeological research into time has focused on the key issue of attempting to understand how people in the past had different concepts of time, this collection also shows how developing a fundamental understanding of archaeological time is central to all archaeology, and impacts on its theory and practice.

**Tim Murray** is Professor of Archaeology at LaTrobe University, Melbourne, Australia.

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## *Contributors*

*D.P.Agrawal*, Physical Research Laboratory, Ahmedabad—380009 India.

*V.Bhalakia*, 12, Archit Bungalows, Amlī-Bopal Road, Ahmedabad—380058 India.

*Michael A.Cremo*, Research Associate in History and Philosophy of Science, Bhaktivedanta Institute, PO Box 1920, Alachua, Florida 32615, USA.

*Roland Fletcher*, Department of Prehistoric and Historical Archaeology, University of Sydney, NSW 2006, Australia.

*Frank Jolles*, University of Natal, Pietermaritzberg, South Africa.

*S.Kusumgar*, Physical Research Laboratory, Ahmedabad—380009 India.

*James McGlade*, Institute of Archaeology, University College London, UK.

*Sheila Mishra*, Department of Archaeology, Deccan College, Pune 411006—India.

*Tim Murray*, Department of Archaeology, La Trobe University, Melbourne 3083, Victoria, Australia.

*Lament Olivier*, Musée des Antiquités Nationales, Saint-Germain-en-Laye 78103, France.

*John Rule*, Department of History, University of Southampton, UK.



## *Preface*

A number of these chapters derive from the Time sessions of the 1994 World Archaeological Congress in Delhi. In the discussions following WAC 4 (and I here acknowledge the assistance of Professor Agrawal) a decision was made to include several chapters written specially for this volume (those of Fletcher, McGlade, Olivier and Rule).

I thank Professor Peter Ucko for his assistance in securing two of these additional chapters, and for his editorial input. I gratefully acknowledge the hospitality of Dr Mark Thompson and Dr Carolie Wilson (Australian High Commission, New Delhi), and La Trobe University for funding to attend the Delhi conference. Thanks are due also to Wei Ming, Department of Archaeology, La Trobe University, who brought all the artwork up to his usual high standard, and to my research assistant, Susan Bridekirk.

Tim Murray



# *Introduction*

TIM MURRAY

It would be generally agreed that the reverse of a grasp on reality is the tendency to fantasy or Utopia. But perhaps there exist more ways than one to defy reality. May it not be that to be unscientific is to defy, for no good logical or empirical reason, established hypotheses and laws; while to be unhistorical is to be the opposite—to ignore or twist one's view of particular events, persons, predicaments, in the name of laws, theories, principles derived from other fields, logical, ethical, metaphysical, scientific, which the nature of the medium renders inapplicable? For what else is it that is done by those theorists who are called fanatical because their faith in a given pattern is not overcome by their sense of reality?

(Berlin 1980:141–2)

There is a convention that books or papers about time, be they by physicists, philosophers, historians or (more recently) by archaeologists, all begin with a statement acknowledging the mystery of time. Ever since St Augustine (*Confessions*, Book XI) pundits have noted that the nature of time is simple enough until you have to think about it, at which point clarity usually becomes the first (and possibly permanent) casualty of the inquiry.

Another useful convention is a statement to the effect that time is a human creation, and that the nature of time is diverse precisely because of the diversity of human culture. Perhaps the final convention is a recognition that the means of ordering and measuring time are fundamental to the practice of science, and that the products of this ordering or measuring are fundamentally important cultural products.

Time is salient to all human affairs and the richness and diversity of our concepts of time are eloquent testimony to this. Furthermore the history of archaeology provides the clearest evidence of the close and binding relationship between time concepts, social and cultural forces, and the terms in which human history is to be Understood. Conventional disciplinary histories, correctly, have made much of the Three Age System, the discovery of high human antiquity, and the impact of radiometric dating on our comprehension of the scale of human



history. Archaeologists, now more than ever before, are aware of the fact that archaeological time not only orders human history, but also has a fundamental importance in creating the phenomena which are the object of our inquiries. How we respond to the challenges raised by our need to understand and manage this influence is a profoundly human issue.

For example, it is now much more widely understood that although time is human (see e.g. McCullough and Calder 1991; Baert 1992; Fraser and Soulsby 1996), there are four clearly distinct notions of it that extend well beyond the traditional oppositions of 'time's arrow' and 'time's cycle'. These have been usefully summarized by McCullough (1991:1–2) as foundational, functional, social and artistic.

For McCullough foundational notions of time are conceptual and these involve the philosophical and theoretical dimensions of time; functional notions reveal time in its physical, economic and moral dimension; social notions bring out the lived and operational elements of time-consciousness and of community perceptions; and artistic notions flow from the imaginative world of human experience. Time is plural and cultural, it can also be singular and absolute, depending upon the context of inquiry or the context within which people seek to communicate (and justify) their understandings of the world.

Over the last decade archaeologists have begun to explore the ways in which this great diversity in the identity of time plays itself out in disciplinary practice. Although such discussions do not yet seem to be regarded as central to considerations of archaeological theory (e.g. Dark 1995; Ucko 1995; Preucel and Hodder 1996), there is a growing body of time literature which indicates that a consideration of time by archaeologists can lead to a fruitful re-evaluation of the relationships between archaeology, history and anthropology.

For example, some practitioners have found in social anthropology a more nuanced account of time as lived experience (e.g. Gell 1992; Munn 1992; Deitler and Herbich 1993; Rowlands 1993; Hughes and Trautmann 1995) and emphasized that archaeologists need to expand their understanding of temporality to include issues such as memory and multi-temporality (e.g. Barrett 1993; Cooper 1993). Similarly, explorations into the philosophy of time, particularly that of Heidegger and Husserl, have been described by some (e.g. Gosden 1994; Thomas 1996) as reinforcing the lessons of anthropology, and throwing out a challenge to archaeologists to rethink traditional approaches to landscape as the arena of human activity. The concept of social landscape (itself a product of renewed connections with human geography) expresses the idea of a clear linkage of space and time in that landscape is also mindscape. Ingold (1993) and others have stressed the need for archaeologists to approach space and time in this way if they are to comprehend past societies. Relating space and time in a more overt theoretical framework also allows new 'readings' of palaeolithic art as being representations of such social things as maps and temporalities (e.g. Boado and Romero 1993).

Other archaeologists, while accepting the value of the landscape approach, have explored different aspects of temporality in ancient societies. For example

Bailey (1993) has argued that the archaeological record of neolithic and chalcolithic Bulgaria indicates the existence of two chronotypes, which in some aspects of social life were opposed, and in others not. This argument for multitemporality within prehistoric societies (and the need for archaeologists to incorporate them into the interpretations they produce) has been reinforced by Mizoguchi's (1993) discussion of temporalities in British late neolithic and early bronze age mortuary practice.

Explorations of the nature of archaeological time and temporality in archaeological records has also cleared sufficient conceptual space to allow for critical reflection about how archaeologists can (and do) write history (Hodder 1993; Barrett 1994). While some have been content to discuss issues of narrative structure and whether the history archaeologists can write is of the same kind as that advocated by the Annales School (Bintliff 1991; Knapp 1992), others have argued that our developing understanding of archaeological time allows us access to philosophical foundations of our discipline (Murray 1987).

In the above examples of a developing account of time and temporality in social archaeology, the emphasis has been on the need for the archaeologist actively to engage in a search for an understanding of the social time of the actors in the past. Although there is a recognition that reconstructions of such social time require the application of concepts and presuppositions (conventionally called theories in this domain of archaeological practice) which are highly abstract, there is also a view (supported by Squair 1994, among others) that these abstractions are no more 'human' (read 'relativistic') in their construction than the chronologies of science time. But does this entail that the only way we can validate knowledge claims based on such 'meaningful' reconstructions is in terms of themselves rather than, say, in terms of the degree to which interpretations articulate with the empirical data they are supposed to relate to (however abstractly)?

This argument is specifically rejected by Murray among others (see e.g. Fletcher and Olivier, Chapters 7 and 8, this volume) who see a developing understanding of archaeological time as being central to a clearer understanding of the nature of archaeological phenomena, hence of the nature and purpose of archaeology. In this view science time, the time of measurement and chronology, is crucial for understanding the phenomenology of archaeological records, creating a theoretical environment which cannot simply be dismissed as being a human construction. Analysis of the history of archaeology (e.g. Murray 1993) has also revealed that current conceptualizations of archaeological time are the expressions of the nineteenth-century foundational agenda of our discipline, an agenda which the debates between 'old' and 'new' archaeologies and between processual and postprocessual archaeologies have revealed as being deeply flawed. Furthermore the maintenance of simplistic oppositions between science time and social time, and the proposition of arguments which do not recognize that the two deeply interpenetrate each other are unlikely to be of much help in moving archaeology onto firmer conceptual ground.

Thus a consideration of archaeological time reveals deep divisions within the

discipline on matters as diverse as the possibility of reconstruction, the means by which theoretical knowledge of the past can be validated, and the nature of the histories and anthropologies archaeologists will seek to write. It is absolutely in keeping with our previous experience of looking harder at other aspects of archaeological practice that we find that traditional certainties are shattered and replaced by difficult but highly significant problems which await solution.

Some of these fundamental arguments about time and phenomenology are taken up in Chapter 1 by Murray, who offers a preliminary and partial consideration of the implications of absolute chronology for our understanding of archaeological ontology and epistemology. Although the bulk of the chapter focuses on a discussion of the scale of archaeological time, and a consideration of the goal of reconstruction in archaeology, conclusions are drawn about the context of theory-building and critical self-reflection in archaeology, conclusions which speak directly to other foundational issues, such as the relationships between archaeology, history and anthropology. Although attention is drawn to the political and social consequences of ignoring the significance of the empirical, as Murray and others have done elsewhere (see e.g. Wylie 1995; Murray 1996, in press), the primary purpose here is to argue that interpretive perspectives which ignore the structural properties of archaeological records are ultimately of dubious utility to archaeologists, no matter how 'relevant' they might make archaeology to contemporary social science debates.

At the Delhi World Archaeological Congress there was considerable discussion of the importance of understanding cultural conceptions of time. There were several reasons for this emphasis, the most obvious being a perceived need to defend indigenous concepts of time from the hegemony of science time, in this sense acting as a tool of colonialism. But there was also a strong sense of seeking to broaden the agenda of science time by providing a meaningful encounter with philosophical systems of other cultures or other times within western culture. For example Agrawal, Bhalakia and Kusumgar, in Chapter 2 of this volume, argue that a holistic framework of time linking the ancient Vedic texts and modern theories about dynamical systems can be constructed. Their proposed framework would have the job not only of integrating the various schools of archaeology, but would also assist us in the search for a common description of time which, in their words, might allow us to create a 'theory of everything'.

The theme of defending different ways of seeing or experiencing time is taken up in Chapter 3. Here Cremo has set himself a somewhat more restricted task of arguing that Hindu concepts of time, particularly those drawn from the *Puranas* which speak of human beings living on the earth for a much longer period than is allowed by archaeologists, have been improperly ignored by archaeologists. Cremo's case, elaborated in *Forbidden Archaeology* (Cremo and Thompson 1993), rests on the close cultural connections between Judeo-Christian concepts of time and the mind-set of western science.

Jolles in Chapter 4 adds still further variety to this cultural mix by drawing our attention to the significance of chronology in the study of human history in Germany during the second half of the eighteenth century. In a counter-argument

to Cremona, Jolles identifies the consequences of a shift in the plausibility of biblical chronology and considers the philosophical origins of the study of prehistory. Jolles' discussion provides cogent explanations for the influence of prehistory on the writing of universal history. It also serves to remind us that conceptions of time (and of course the nature and purpose of archaeology) have changed during the short history of archaeology.

There are many reasons why concepts of time change. An obvious source of influence is provided by the recognition that different conceptions of time exist in different cultures, a recognition that has become very widespread during the course of the last 200 years. The history of our own society provides additional evidence of change and Rule, in Chapter 5, offers a detailed and textured discussion of the social contexts of industrial time as they have developed over the last 150 years. In this chapter Rule breaks new ground by emphasizing that the processes of industrial change as they actually occurred were in large part determined by the structures of the pre-industrial societies which were being impacted upon.

Turning from the perception of time as a human construct and exploring the role of science time in shaping archaeological interpretation and explanation we find similar diversity in approach and purpose. In Chapter 6 Mishra considers the close relationship between the puzzles and problems thrown up by the acquisition of anomalous empirical data (in this case dates), and the theories we use to either explain them (or to explain them away). Reflecting on the last twenty-five years of research into the chronology of the Indian stone age Mishra elegantly demonstrates that dates and paradigms are in tight relationship.

In Chapter 7 Fletcher examines the diverse impacts of archaeological time on notions of temporality, process, and of the structural properties of archaeological records from the perspective of research into the consequences of urbanism (Fletcher 1995). He understands that the quantification of time leading to the development of time-scaled perspectives of human behaviour literally creates the phenomena we study.

Olivier pursues a different purpose in Chapter 8 providing the basis of a dramatically different reading of the archaeology of Late Hallstatt 'princely' graves. He establishes that archaeological phenomena are very complex entities that can be re-described in ways which solve (or at least dissolve) many contemporary interpretive puzzles and problems. Perhaps the most important argument is that the graves themselves are multi-temporal, hence admitting the likelihood of changing meanings over time.

In the final chapter McGlade builds on his important early inquiries (1990, 1995) into the application of non-linear dynamics to archaeological explanation and interpretation, by presenting an account of archaeological time which allows for the application to archaeology of models of historical narrative developed in recent years. He tailors Shermers' (1995) model of contingent necessity to advance an account of how archaeological narrative can both be plausible and not violate the tenets of non-linearity. This is a strikingly different account of archaeological narrative than that offered by Barrett (1994) or Hodder (1993),

but it comes closer to describing a ‘possibility space’ of history writing which is more closely related to the types of empirical data archaeologists have to deploy (and explain).

This book represents a sample of the diverse ways in which discussions of time and discussions of archaeology overlap, intersect or remain separate. Above all, these contributions, which are written from within a variety of theoretical agendas, seek to advance the study of time in archaeology in ways that will enhance understanding of its implications for what archaeologists do, and the means by which they communicate this to the world outside the archaeological profession.

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# 1 *A return to the 'Pompeii premise'*

TIM MURRAY

## INTRODUCTION

The core of the chapter is an analysis of some responses to calls for time perspectivism in archaeology, and to the 'Pompeii premise' debate between Lewis Binford and Michael Schiffer which took place in the 1980s. Analysis of the very strong responses to both issues confirms that, underlying disputes about the measurement of time and the nature of archaeological phenomena, are serious divisions between archaeologists about the nature and purpose of archaeological knowledge. These disputes may not conform to a neat opposition between 'processual' and 'postprocessual' archaeologies, but neither do they allow alternative approaches (such as those seeking to re-describe and reinterpret archaeological phenomena as non-linear or dynamical systems) to escape unscathed (see e.g. Murray 1997).

Nonetheless my discussion of the disputes does have relevance to the conflict between 'processual' and 'postprocessual' approaches in that these are the contemporary formulations of conceptual, epistemological and theoretical antinomies which have been present in archaeology since its foundation (see e.g. Murray 1987: Chapter 1). Notwithstanding the language used at any point over the last 200 years, the boundaries of dispute have tended to remain constant—who will be able to produce an archaeology which is the most relevant to contemporary society, who can best warrant knowledge claims, whose view of the past best encapsulates the goal of an archaeology that is both meaningful and logically, epistemologically and metaphysically coherent and defensible? And, most importantly, who will win the battle for the hearts and minds of the community of practitioners and how might this victory be won?

But responses to time perspectivism and to the 'Pompeii premise' debate reveal more than a simple continuation of disciplinary antinomies. They also reveal the possibility of radical transformation both of the nature of archaeological knowledge, and of the relationships between archaeology and other disciplines. The source of these potential transformations lies in the recognition that conceptual and epistemological debate with contemporary archaeology should now be understood as being primarily centred on the tension between a developing understanding of the importance of the structural

properties of archaeological records (in helping us conceptualize what is to be described, interpreted or explained), and the traditional theoretical authority and primacy of views of how human action can be meaningfully described and understood—which lie at the core of anthropology, history and the social sciences generally.

But alongside the possibility of transformation is the probability of repression (Murray 1993). It would be sheer folly to argue that transformation in either area (let alone both) of archaeological practice will occur swiftly or easily, simply because of a demonstration of the logical and epistemological shortcomings of both 'processual' and 'postprocessual' archaeology. Indeed a significant part of my purpose here is to identify some of the sources of inertia and resistance which act to shut down an exploration of such fundamentals, and to re-direct debate back into traditional (and ultimately conceptually sterile) antinomies. I conclude the chapter with a description of the strategies archaeologists can employ to overcome such inertia and resistance, all of which hinge on the recognition that archaeological inquiry pursued in a way which does not ignore the structural properties of its data is of greater potential value to contemporary society than the currently fashionable alternative.

### **ARCHAEOLOGICAL RECORDS: TIME, SCALE, PHENOMENON**

Over a decade ago Bailey (1983) usefully summarized one sense in which the application of absolute time to prehistoric archaeology had begun to act in a way which could change contemporary views of what practitioners should explain, and the means by which explanation could be plausibly managed:

Above all, new dating methods have demonstrated that human cultural history extends over a timespan of at least two million years. This poses in a new way the issue of how we are to make use of knowledge of the past, what questions we should ask of it, and whether by archaeological investigations of human activities over this timespan, we can learn something new about human nature not available from other sources.

(1983:165)

In the course of a review of the terms of conflict between what he called 'environmentalist' and 'internalist' approaches to the explanation of human cultural change and variation (which do not necessarily equate to all those who would now class themselves as being 'processualist' and 'postprocessualist'), Bailey observed that proponents of either approach were not referring to the same phenomena when time was considered. For Bailey, time concepts:



should be central to archaeological investigations of past behaviour. They provide a unifying framework for discussing the different ways in which we as archaeologists think about past human behaviour, and a unifying framework for discussing the different sorts of past phenomena which are the objects of our archaeological investigations.

(1983:167)

Bailey here raised one of the more thorny issues of dispute between ‘environmentalists’ and ‘internalists’, that of uniformitarian propositions, and the validity of the present as a source of analogical inference about the past. In 1983 Binford’s ‘actualistic’ frame for the establishment of models of systems diagnosis made explicit reference to the present being the only basis for establishing a theory of cultural dynamics. Similarly, around the same time the ‘internalist’ position on material culture theory had as its centrepiece the view that the context of human—material culture interactions most appropriate to the study of past human action was to be provided by present-based material culture studies. Moreover, it was clear that both ‘environmentalists’ and ‘internalists’ subscribed to the view that the structures of our understanding of the present can be the only reliable guide to making manifest the meanings of the archaeological past. Without uniformitarian assumptions the past would simply be beyond our apprehension. As Wylie (1982:43) contended, to postulate a past to which uniformitarian assumptions cannot be applied is to ‘postulate such a total discontinuity that the past is considered completely unreconstructable from its material record and knowledge of contemporary cultural phenomena’.

Bailey considered this line of argument to be both mistaken and implicitly turning the discipline towards a model of knowledge production which sacrificed the singularity of the archaeological record as a record of human action on the altar of contemporary ‘meaningfulness’ as defined by short timespan ‘human’ and ‘social’ sciences:

For, if the data relating to past behaviour are unreliable and can only be interpreted in terms of present processes, then it seems to follow ...that we can never discover in the data of the past any generalizations that we do not already know. Consequently archaeologists have only two choices: either we aspire to generalizations, in which case we are doomed to produce knowledge which is trivial; or we concentrate on the differences between events and situations, in which case we opt for the subservient role of an idiographic discipline, destined to consume the generalizations of others but never to produce any of our own.

(1983:174)

For Bailey the archaeologist had to meaningfully confront the implications of archaeological time, in particular the perception that long-term processes are not

apparent in the short-term record of ethnography, history or sociology (despite the fact that historians such as Braudel (1972, 1981) applied the same distinction within history itself). To this end he advanced a useful distinction between two kinds of uniformitarianism used by archaeologists—who frequently seemed unaware that they were conflating them. First, methodological uniformitarianism which ‘asserts a belief in the spatial and temporal invariance of general laws, essentially as a procedural principle for bringing past events within the scope of empirical investigation’ (1983:174). Second, substantive uniformitarianism which ‘asserts a belief in the uniformity of specific geological processes, notably that these occurred at the same rate in the past as at the present day’ (1983:174). Having established these definitions Bailey proceeded to a discussion of the dispute between ‘environmentalist’ and ‘internalist’ approaches both about what is to be explained and about the means by which plausible explanation could be managed. He concluded that critical aspects of the dispute between the advocates of the two approaches stemmed from a widespread conflation of these two different kinds of uniformitarianism.

However, we should be clear that Bailey wished to rescue the analysis of human behaviour over long timespans from the necessity of securing high levels of reconstruction that had been promoted by the ‘internalists’ as being necessary to avoid a functionalist, dehumanized past. Referring to the palaeoeconomic literature on long-term processes Bailey extracted three notions:

(a) that there are essentially only two scales of behaviour—long-term and short-term; (b) that long-term processes are dominated by environmental and biological interactions, by relationships between genetics, demography, and economic exploitation of the natural environment, whereas short-term processes are dominated by social and psychological processes, by social rules and relationships and individual goals and motivations; (c) that behaviour at these different scales requires different sorts of explanations expressing varying degrees of proximate and ultimate causation and varying emphasis on historical (in terms of the past), functional (in terms of the present), or teleological (in terms of the future) causes.

(1983:180)

Further support for his view that the establishment of the meaning of long-term processes in archaeology requires different explanatory exemplars than that of short-term ones (in essence the replacement of anthropological models by models drawn from disciplines such as palaeobiology, see Gould 1980, 1989) came from a notion of entropy in the archaeological record:

Conversely, so it is argued, internalist approaches emphasize small-scale processes which vary rapidly over short timespans; but these are processes which are likely to fade out of focus over long timespans because of the decreasing resolution of the archaeological data and

the increasing margin of error in dating methods as one moves further back in time.

(1983:181)

A decade later the time perspectivist position outlined by Bailey has been further developed by Fletcher (1992), Murray (1987, 1993, 1997; Murray and Walker 1988) and others. Although a focus on developing the theoretical infrastructure of an archaeology of the long term has continued, the neat division of human behaviour into 'short-term' and 'long-term' argued for by Bailey is now considered to be of doubtful utility. Of potentially greater interest is a search for a more nuanced understanding of the relationship between the measurement of time in archaeological contexts and the constitution of archaeological phenomena as sources of information about the human past. This search has provided the justification for the beginnings of a re-examination of archaeological ontology and epistemology which goes right to the heart of disciplinary identity. Notwithstanding these developments, time perspectivism has not gained widespread acceptance, even among archaeologists who profess a commitment to scientific archaeology. It has also attracted fire from 'postprocessual' archaeologists, not least because all sides, 'processualists' as well as 'postprocessualists', recognize that whatever knowledge about human beings would be produced under its rubric would, at the present time, be very difficult to relate to contemporary human experience (see e.g. Dunnell 1982).

Bailey's original formulation of the issues has been attacked on several occasions (Shanks and Tilley 1987:120–5; Squair 1994:92–113; Thomas 1996:36). These attacks have tended to focus on the implications of the claim that a prehistoric archaeology where the short-term 'ethnographic' scale is literally invisible, requires the building of archaeological theory which is likely to be very different from contemporary social theory. Shanks and Tilley essentially set the boundaries of a 'postprocessual' response to time perspectivism in their rejection of Bailey's objectivist account of time, his relegation of the social to epiphenomenal status in much of prehistoric archaeology, and his view that archaeology needs to be a distinct and autonomous discipline in order to have the freedom to formulate concepts and categories that are more appropriate to the structural properties of its data. For them the division of short term (essentially a conjectural social archaeology) and long term (featuring the study of large-scale processes and structures) was 'a disabling theoretical fragmentation' proposed by Bailey simply 'for the sake of justifying archaeology as a separate discipline' (1987:123).

On this, and a number of related matters, Shanks and Tilley demonstrate logical confusion. The justification for prehistoric archaeology being a discipline distinct from sociology or social anthropology is to be found in the fact that significant aspects (but not all) of the structural properties of data are radically different from those which are the focus of contemporary social theory. Thus the argument for distinct disciplinary status comes from the fact that there are phenomena routinely dealt with by prehistoric archaeologists which appear to need to be theorized in very different ways (see e.g. Murray 1997). To go further,

in this reading Shanks and Tilley's 'disabling theoretical fragmentation' is simply an outcome of the fact that new conceptualizations of archaeological phenomena require a serious theoretical response from practitioners.

Following this line of argument, for Shanks and Tilley to oppose Bailey's call for a distinct discipline to manage the development of new, more appropriate, concepts and categories, they would have to show how existing social theory could be developed to deal with puzzles and problems of the kind described by Bailey. Alternatively they could demonstrate that the discipline of archaeology might expand its conceptual frontiers (for example as biology could do with palaeobiology), and recognize that the issues of scale and structure raised by Bailey were real, and that archaeological theory needed to be built which reconciled divergent approaches.

In practice they did neither, opting instead to launch an attack (under a downpour of Latin tags) on what they considered to be Bailey's separation of past from present, and the simple-minded empiricism which threatened the theoretical hegemony of social theory in archaeology. Although it should be acknowledged that elements of Bailey's account were indeed confusing and underdeveloped, which is hardly surprising given that this was the first serious treatment of a very complex problem of relating time perspectivism to the practice of archaeology, a 'postprocessual' response to time perspectivism looks more like a declaration of a turf war about who gets to set the conceptual boundaries of the proper study of human beings.

Shanks and Tilley's argument that Bailey was separating past from present and limiting the ways in which contemporary people could make meanings in the past because some could be more directly related to empirical data than others, was also taken up by Squair. The strength of his reaction to what he seems to be claiming are abuses of the 'privilege of retrospect' can be read as exposing a fear that a familiar traditional relationship between archaeology and other disciplines studying human affairs might now need to be reconsidered. Squair goes the whole hog:

I want to argue that archaeological uses of time are a crucial part of a logocentric ontological conspiracy to locate the past in the past, to create a reverence for a contrived *arche*. This involves a consideration of various archaeological attempts to explicate or rather manipulate the concept of time to effectively ensure that the past remains a political irrelevance, an *arche* beyond reproach. Effectively, the exclusive presence of a linear chronology at the expense of alternative and suppressed temporalities represents a covert ideological operation to promote the former expression of conceived time as absolute and independent.

(1994:93)

The exposure of the scientists under the bed presumably doing the bidding of western capitalism, or at least conniving at the repression of traditional (read non-western) ways of seeing, seems to depend on the wholly false notion that to do

science is not to do what *other* people do with pasts—create them in terms intelligible to presents—whenever these might be. The fact that Bailey’s present or Binford’s present include an account of the archaeological record and argue that this account has significant epistemological consequences, neither of which views Squair can agree with, does not in any way necessitate the postulation of a past which is closed, completed, described once and for all and then dispensed with. Indeed the practice of science implies the *exact opposite*. In fact arguments for time perspectivism *can* have great social and political implications for the present—not least because they can make a very useful contribution to the practice of critical self-reflection by archaeologists, in that they expose for analysis a whole suite of currently fashionable assumptions about the terms under which presents can articulate pasts, and the degree of security which can attach to the knowledge claims which result from them. Squair’s avowedly *political* reaction (1994:106) to time perspectivism gives the lie to his own argument.

Having settled this common misapprehension we can quickly deal with other misconceptions—such as the belief that time perspectivism requires the postulation of an original ‘real’ past (1994:94), and that its existence is best dealt with by proposing that since all archaeology is a social construct, the best way to respond to time perspectivism is to engage in social and political critique. Notwithstanding a comprehensive confusion about epistemological relativism and Cartesian ontologies, the core of Squair’s problem with time perspectivism is that it has allowed us to identify phenomena which don’t fit his scheme. Squair calls this ‘arrogant’ and ‘conceited’ but provides no counter-argument beyond asserting that absolute chronologies are social constructs, and that if this constructedness were recognized, archaeology would collapse into an eternal present and it would, therefore, not need to separate itself from the contemporary social sciences. ‘Archaeology, a bizarre intellectual pantomime, would gradually suffocate in the temporal vacuum that is called the present’ (1994:102). Bizarre indeed, but why the need for all these confused gyrations?

Squair, like Shanks and Tilley, well understands that time perspectivism (macrotemporality) can be used to support approaches which ‘deny social concepts formulated in routine discursive practice, such as gender, a formative role in archaeological explanation’ (1994:105), and that, following Wylie, an ‘emphasis on long-term social structures is detrimental to these studies, for this creates a resistance to such initiatives on epistemological rather than theoretical grounds’ (1994:105). But *can* does not necessarily mean *must*, in the sense that Bailey himself argues that the nature of what is to be explained and how it is to be explained should vary according to the specific structural properties of specific archaeological records.

For some this might be too high a price to pay, others might accept that not all elements of contemporary social discourse can be pursued with equal profit in all archaeological contexts, still others might see this as a challenge to develop such theories to the point where they are less abstract and more convincingly articulated with archaeological phenomena. There is no legislation here, rather the existence of a challenge posed by the empirical which cannot be shuffled off

by appealing to the theory dependence of observation. Archaeological records are complex and multi-faceted, created by a diversity of theories, assumptions and working hypotheses. Squair simply misses the point that this is not just about epistemology, it is also about the whole context of theory-building in archaeology.

What is interesting is that Bailey has advocated a distinctive archaeology, so that practitioners might use its conceptual space to develop something different, and potentially more appropriate to certain archaeological phenomena. In Bailey's view this conceptual space is not currently available in an archaeology dominated by the conceptual and categorical structures of the ethnographic scale. The responses of Shanks and Tilley, and Squair's hysteria about the threat posed by time perspectivism certainly lend support to Bailey's reading of the socio-politics of his own discipline. Nowhere in any of these reactions to time perspectivism is there a recognition that taking a good hard look at the structure of contemporary theory might be wholly beneficial to archaeology. What, besides the need to defend dominant, but essentially unexamined, assumptions about the nature and value of archaeological knowledge, could be wrong with arguing the value of an environment where the ability of theories to convincingly articulate with the phenomena they purport to explain becomes a significant test of the plausibility of any account of the past? Some time ago Renfrew considered the implications of an archaeology too strongly wed to the theoretical *a priori*:

To do this carries with it the danger of constructing elaborate theoretical systems, internally coherent in themselves and perhaps intellectually satisfying in an ultimately rather circular manner, but yet incapable of interacting with the data through testing against existing material or by a quest for new finds.... But let us remember that our ultimate goal is not so much theories which conform to our own *a priori* view of the world, but those theories which actually *work*.

(1982:143, original emphasis)

## **ARCHAEOLOGICAL RECORDS: RECONSTRUCTIONISM AND ITS DISCONTENTS**

But time perspectivism is not the only challenge to contemporary archaeological practice. In 'Behavioural archaeology and the "Pompeii premise"' (1981) Binford argued that appropriate models for understanding human action in archaeological contexts could only be developed when it was understood that archaeological records (as records of human action) were substantially different to ethnographic records. What made this discussion all the more interesting was his related argument that Schiffer's (1976) work on site formation processes equated with the 'Pompeii premise', first described by Ascher twenty years before (1962). Although, given its tone, we might be forgiven for reading the paper as an

exercise in vilification, Binford addressed the critical issue of whether archaeologists could use the empirical character of the archaeological record as a justification for limiting the archaeological apprehension of ‘cultural context’ or ‘social behaviour’. On the surface it might seem that Binford and Shanks and Tilley had grounds for a rare coincidence of perspective, but this is not the case.

Binford’s argument that archaeologists cannot plausibly do this without courting the charge of empiricism was based on a view of the archaeological apprehension of human behaviour which differs markedly from that found at the core of the ‘postprocessual’ programme:

I have never viewed the reconstruction of prehistoric lifeways in the form of prehistoric ethnographies to be an appropriate goal for archaeology in general. It has been clear to me that the timeframe of ethnography is largely inappropriate for archaeological research. Rates of deposition are much slower than the rapid sequencing of events which characterizes the daily lives of living peoples; even under the best of circumstances the archaeological record represents a massive palimpsest of derivatives from many episodes.

(1981:197)

So much for the detailed levels of reconstruction necessary to mount a ‘humanized’ past (as conventionally defined by Hodder and others):

I have considered it necessary for archaeologists to investigate the archaeological record as a different order of reality, the patterned structure of which represents not a simple accumulation of little events but rather some of the basic organizational constraints and determinants operating on the events or episodes of daily living. The archaeological record is therefore not a poor or distorted manifestation of ethnographic ‘reality’ but most likely a structured consequence of the operation of a level of organization difficult, if not impossible for an ethnographer to observe directly. This level of organization is likely to be the unit upon which evolutionary selection operates, rather than at the level of the specific event.

(1981:197–8)

This characterization of the differences between the archaeological and ethnographic records led Binford to reject the ‘normative-additive’ view of culture, and to advance the view that the archaeological record comprises the static remnants of past dynamic systems. Having laid out his differences with Ascher and Taylor (1948), Binford turned his attention to ‘behavioural’ archaeology—particularly to Schiffer’s argument that there is no ‘equivalence between a past cultural system and its archaeological record’ (Schiffer 1976:12).

Schiffer’s proposal that the processes which have distorted the archaeological record (from archaeological to systemic context), summarized by him as AS, AA,

SA and SS processes (see also Schiffer 1987), incorporates cultural and natural transformational conditions (C-Transforms and N-Transforms). For Schiffer archaeological sites are formed by the interaction of these processes and transformational conditions. Therefore the business of the archaeologist extends beyond a simple 'reading-off' of human behaviour from archaeological remains. Archaeologists also need to understand what aspects of human behaviour and what natural transformations of archaeological deposits and their constituent elements, lead to the formation of sites as phenomena. This characterization of the empirical nature of the archaeological record carries an explicit warning to both 'processualists' and 'postprocessualists' that the nature of the archaeological record as a record of human action is not the subject of common-sense understandings. Rather, archaeologists of whatever stamp should not blithely proceed as if the character of the record was self-evident.

Binford's reaction to Schiffer's proposals is, on the surface, somewhat puzzling. How could Binford possibly dispute the importance of establishing the empirical constraints on archaeological inference and analogy? Why is a view that archaeological deposits are not the fossilized remnants of human action an 'intellectual capitulation of processualist views to major components of the traditionalist position' (Binford 1981:202)? It transpired that Binford reacted in this fashion because he considered that 'behavioural' archaeology re-committed archaeology to a inductivist, empiricist and reconstructionist strategy, in sum to place stress on the limitations of the archaeological record for the pursuit of anthropological goals.

Central to this objection was Binford's notion of the archaeological record as being the result of the operation of dynamic systems, and that the business of the archaeologist is to explain that operation, because these are the terms of archaeology's contribution to anthropology. For Binford, if it is proposed that these dynamic systems are *in themselves* distortions of another reality, then what is to be explained slips back towards short-timespan, highly detailed reconstructions of human action—the very goals for archaeology which its phenomenal character make it impossible (in Binford's view at least) to convincingly fulfil. More important, notions of distortion imply some understanding of what has been distorted. In Binford's view Schiffer assumed that archaeologists must first know the substance of cultural forms and then trace the processes acting to distort them, before they could correctly ascertain the character of what is to be explained. Accordingly, Schiffer is enmeshed in the 'Pompeii premise'—that archaeologists need to mirror ethnographic reality in order to confer meaning on the archaeological record:

The 'new archaeology' has primarily involved a claim that we did not know all the sources of variability contributing to the archaeological record. Given this condition, new archaeologists have argued that it is premature to offer an a priori evaluation as to the 'limitations' of the archaeological record for yielding up information...

(1981:204)

In this reading Binford went beyond an application of the second law of



thermodynamics to archaeology with predictable results. Things get disordered as time passes. The arrow of time flies from past to future and time is irreversible. Binford's analysis of Schiffer's 'behavioural' archaeology also provides an archaeological version of Heisenberg's uncertainty principle—that it is impossible to know exactly where to stop the process of controlling for distortion unless you already know what the pristine, undistorted form was. Hence the counterintuitive conclusion that expending effort on understanding formation process provides only chimerical value, because the asymmetry of time makes exact reconstruction an impossibility. Perhaps more significant is that if we were to entertain the possibility of complete reconstruction then this would, logically, obviate the need for archaeology as there would be no need to explain what we already know.

Binford's account of the 'Pompeii premise' raises many significant issues, only a few of which can be touched on here. In the context of this chapter I will outline the substance of Schiffer's response, and through this advocate the value of research into formation processes as a way in which we can create an empirical basis for establishing the 'tolerance limits' of archaeological interpretations and explanations. However, before I do this I want to explore further the terms of Binford's account of the nature of archaeological records insofar as it bears upon an understanding of debates about reconstructionism. In the course of this discussion I will comment on a paper by Patrik (1985) which has been used by 'postprocessual archaeologists' such as Thomas (1996:55–64) to attack the time perspectivism of Bailey, Binford and Schiffer.

A critical feature of Binford's thought (developed in the years between 1962 and 1977) was his belief that archaeologists could not use the archaeological record as a source of information about dynamics. For Binford the epistemological challenge was (and still is) posed by the static nature of the archaeological database, which he took to be conclusive support for an argument against using it as the empirical domain of testing (see especially 1983:7–17). The rejection of a role for reconstructionism was perhaps a more dramatic departure from popular understandings of the goals of the 'new' archaeology. Reviewing one of his areas of difference with Schiffer, specifically the level of description requisite for a worthwhile characterization of the activities performed at an archaeological site, Binford stressed that he did not think that studies of formation processes would 'yield much insight into either the nature of cultural systems or archaeological methodology' (1983:165).

More significant here is the view taken by Binford that the level of reconstruction required by behavioural archaeology is inappropriate for the development of a theory which explores the relationship between cultural statics and dynamics. A significant feature of Binford's views on the need for a theory of cultural statics stemmed from his reading of the behavioural implications of the archaeological record, as it is constituted in nature. Although Binford had previously demonstrated his adherence to the anthropology of Leslie White, and re-emphasized his rejection of the normative view of culture on many occasions (see e.g. Binford and Sabloff 1982) it was not until his reflections in *Working at Archaeology* that a full exposition of his views appeared (see e.g. 1983:215).

Binford's acceptance of White's characterization of opposition to a science of culture stemming from anthropocentrism surfaced in his review of Spiess (1979) which was reprinted in Binford (1983:215–17). Castigating Spiess for idealism Binford concluded that we 'want to understand cultural differences, not deny that they can be understood' (1983:216). An important element of the development of Binford's opposition to the practice of attempting to 'build theories about the characteristics, of people, as the basis for understanding why people behave in culturally distinct ways' (1983:219) was his view that constant properties cannot help us to understand or explain cultural diversity. Although the utility of optimization models can be disposed of via an appeal to the relativism of human rationality, Binford had also to dispose of free will in order to argue that historical events are phenomena in need of explanation (see e.g. 1983:221).

Here Binford was working towards an account of the differences between the archaeologist's and the ethnographer's views of culture and, by extension, differences between them about what is to be explained. Significantly, Binford emphasized that the empirical character of the archaeological record should be the prime determinant of difference at this level (1983:221). Binford's perspective that the structure of the record revealed an inner organizational structure of human cultural systems which operated over long timespans is central to his view that the goal of the archaeologist is to understand human behaviour through the analysis of such long-running systems. Yet Binford clearly understood that such long-running systems change over time, in his terminology that the *reproductive mode* of cultures is different from their *adaptive mode*. Significantly, Binford sought what he calls the *determinant dynamics of descent with modification* in Whitean energetic terms, with the interaction between the cultural system and its external physical environment being the primary source of change and variation.

Equally significant, Binford appeared to hold a deterministic view of human cultural systems—a culture 'enculturates' its members, it acts on them rather than the reverse. Pattern in cultural remains is observable (hence culturally real) because of the process of enculturation. Explanations for disorder (change and variation) in the pattern must be sought in external (environmental) factors which, unsurprisingly, are likely to leave relatively unambiguous empirical markers. The link between systems and a functionalist account of human action is thus easily made (1983:222–3).

Binford's views about what is knowable about prehistoric human action linked tightly with an understanding of the cognitive plausibility of our structures for knowing the present. Indeed, the kind of anthropocentrism opposed by White was also a major target for Binford, and is most clearly seen in his advocacy of middle range theory in archaeology. It is worth noting here that the search for systems diagnosis as the proper goal of archaeology also, for Binford, implied a scepticism about the attractions of reconstructionism precisely because it can manufacture the past in the image of the present (1983:411).

In the course of this brief exposition of a link between Binford's views about the nature of the archaeological record, the proper goals of anthropology and the nature of an appropriate archaeological epistemology, I have also emphasized the

importance of Binford's expectation that archaeological data pose problems to the anthropologist which are unlike those stemming from any other anthropological database. In this Binford shared Bailey's goal of finding a disciplinary environment where archaeological data as a source of information could be protected from the ravages of the a priori (see especially 1983:415).

It is this sense of possibility (and necessity) which is central to Binford's advocacy of middle range theory, although we should be clear that, while he was in principle correct that appropriate frames of reference for understanding significant aspects of archaeological records are lacking, Binford was clearly mistaken about the level of prior development of cognitive devices for that purpose, and of the support which has grown for archaeologists to respect and work with nonscientific or non-western perspectives. Indeed, his own acceptance of a broadly Whitean functionalism, his concentration on the 'system', and his denial of intention as an archaeologically significant facet of human action clearly demonstrated the theory-ladenness of his turn to middle range theory.

Schiffer has always rejected Binford's criticism that he is enmeshed in the 'Pompeii premise'. However, in his reply (1985), and in his *Formation Processes of the Archaeological Record* (1987), Schiffer did not engage with Binford's core criticism of reconstructionism. Rather, he has reconfirmed his (common-sense) view that archaeologists need to have a detailed understanding of site formation processes so that they can be clear both about what questions can be asked of sites (what is to be explained), and about the means by which archaeologists can best articulate empirical phenomena with research questions. Schiffer also does not address Binford's central objection to a link between 'behavioural' archaeology and the retention of ethnographic scales of analysis and interpretation. But he is not alone in this, as the discussion of the Binford/Schiffer debate by Smith (1992) focuses only on the common-sense matter of controlling data quality rather than exploring the very difficult theoretical landscape created by Binford's rejection of the possibilities of reconstructionism.

Thomas's (1996:55–60) analysis of the debate centres discussion on the objectification of a completed past that has no 'presentness' in it, is a more thoroughly worked version of similar arguments made by Shanks and Tilley and by Squair. Notwithstanding the fact that Thomas has at least tried to engage with both Schiffer and Binford, his fondness for philosophical absolutes and oppositions (noted also by Oudemans 1996) allows traditional confusions to remain. The nub of the problem can be sourced to a discussion of ambiguity in archaeologists' understanding of the concept of 'the archaeological record', as either fossil record or record of the doings of archaeologists transformed into texts (Patrik 1985). Much of Thomas's approach to Binford and to Schiffer is based on his view that they both adhere to a notion of archaeological record as fossil record, although he understands that they conceive of this differently. But a careful analysis of Schiffer and Binford clearly indicates that they also both accept the notion of archaeological record as a record of the attitudes of archaeologists to what is at any time during the history of archaeology considered to be archaeological phenomena. Schiffer actually cites Patrik in support of this view:

The concept of 'archaeological record' itself, as Patrik (1985) points out, is fraught with ambiguities because we can only perceive that record through the activities and reports of archaeologists. The archaeological record is, finally, the documents that describe what was recovered and analyzed and what procedures were used.

(1987:339)

Indeed for Schiffer the presentness and incompleteness of the past lies in the very fact that archaeologists, by virtue of their actions, bring phenomena back from the archaeological context into the systemic context (the context of the present). Notwithstanding Thomas's confusion (1996:56) Schiffer does not only conceive of archaeological remains 'as being a record of a functioning system which is somehow stopped in time', when the essence of his characterization of formation processes is that they can continue into the present.

It might be said that Thomas's confusion follows Schiffer's, in that his doctrine of behavioural archaeology (and the logic of reconstructionism he espouses) does conform to Thomas's account of an archaeology of frozen systems, while his account of archaeological records as phenomena upholds a different view. Schiffer's acceptance of the power of the present to construct the archaeological record could indeed provide the basis of a counter-argument to Binford's accusation that Schiffer is enmeshed in the 'Pompeii premise', in that the goal of perfect reconstruction is impossible, but that the needs of the present (in defining the terms of a plausible reconstruction) can be supported by an exploration of data quality (and a definition of the reliability or tolerance limits of the reconstructions provided by the archaeologist). Neither Schiffer nor Thomas evaluated this line of argument (nor a number of corollaries which logically flow from it).

For Binford the issue is slightly different. While it is certainly true that Binford's anti-reconstructionism is supported by his view that archaeologists can observe the futures of pasts, he does recognize that an archaeological characterization of such futures needs to be conceptually and categorically symmetrical with an archaeological characterization of pasts. In this sense the fact that some archaeologists understand this (and most don't) directly impacts on present practice.

Binford's characterization of the distinctive structural properties of archaeological records (and his discussion of their ontological implications) is *of the present*. In other words, describing the probability of there being pasts which may be made intelligible in terms different from those that we use to make the present intelligible, effectively challenges the veracity of the instruments we use to *create the present*. This is no archaeology of disengaged, completed pasts, made up of fixed or stable entities, a fact which again is attested by the strength of Thomas's rejection of what he (wrongly) thinks is Binford and Schiffer's argument for a hermetically sealed past.

Perhaps the problem is finally one of defending the domination of a particular theoretical perspective—of being exclusive rather than inclusive. For Thomas (as

with Shanks and Tilley and with Squair) it is easier to be critically self-reflective about approaches you don't like rather than those you want to advocate strongly, because of their *assumed* value as guides to comprehending present experience. How else could Thomas miss the irony of this:

Like other forms of science, archaeological analysis involves a way of knowing which is derived from everyday forms of attunement to the world. What I take this to mean is that archaeology must be a fundamentally reflexive discipline. Whatever we learn about people's lives in the past should make us reflect upon the context within which we conduct archaeology in the present, and vice versa. Whatever analytical frameworks we use in order to understand the past should equally be turned onto the present.

(1996:234)

## CONCLUSIONS

There are no closed frontiers between intellectual approaches, only closed minds which refuse to cross them.

(Gell 1992:322)

In this chapter I have carefully avoided offering a detailed critique of Bailey's time perspectivism, or of Binford and Schiffer on the 'limitations' of the archaeological record. I have also carefully avoided a detailed characterization of the possibility of reconstructionism, the possibility of radical transformation in the ways we seek to attach meaning and value to archaeological records, and the notion that time perspectivism and a coming to terms with the structural properties of archaeological records hold out the prospect of a fundamental shift in the way we write human history in the deep past. My avoidance of these important tasks in the present context should not be taken to imply that Bailey's division of archaeological time/process into short term and long term is logically or practically sustainable, or that Binford's account of archaeological statics and dynamics (and the conclusions he draws from this) are problem-free. Both implications are very far from the truth.

I have, instead, focused discussion on some 'postprocessual' accounts of these matters and sought to unpack certain crucial assumptions made by these critics, if only to demonstrate that archaeologists (whether they be 'processual' or 'post-processual') have yet to seriously engage with time perspectivism or with the implications of our developing comprehension of the structural properties of archaeological records as phenomena. The most important assumption to be refuted was that an archaeology concerned with understanding and responding to the structural properties of its data could be ignored, because it was held to be 'of the past' rather than being 'of the present'.

Although it was only a subsidiary goal, my discussion of the reactions of Shanks

and Tilley, Squair, and Thomas revealed a number of misunderstandings about these issues which opens up the probability that more detailed analyses of 'postprocessual' archaeology will reveal further difficulties of this kind. Notwithstanding this, it is also worth noting that such misunderstandings exist (probably in greater scale) within 'processual' perspectives. It is significant that 'processual' archaeology has only rarely sought to engage with time perspectivism or the 'Pompeii premise' debate, beyond producing a growing raft of studies into site formation processes, and distributional archaeology. Certainly, on those few occasions where archaeologists have sought to consider the implications of such views of the nature of archaeological phenomena (see e.g. Stern 1993, 1994) the response of 'processualists', although swift and vitriolic, displays a similar attachment to traditional modes of inquiry and a similar level of logical confusion to that manifested by 'postprocessualists' (see e.g. Bunn and Kroll 1993; Sept 1993).

Again, although there can be no doubt that detailed studies into the structural properties of archaeological records can indeed help us to be clearer about the appropriateness of questions and the plausibility of answers which are applied to, or derived from, different archaeological records, it is equally obvious that these approaches are still far from being articulated in the business of building archaeological theory. A case in point is provided by recent debates about whether chaos theory can offer useful models or analogies to support an inquiry into the human past. Roth and Ryckman correctly identify that claims about the value of chaos differ considerably:

for instance depending on whether a nonlinear ('chaotic') dynamics is held to be literally driving historical processes or whether it provides only a suggestive analogy for fashioning a new genre of historical narrative.

(1995:31)

Nonetheless the first serious applications of non-linear perspectives in archaeology (see e.g. McGlade 1995, and the papers in van der Leeuw and McGlade 1997) show a strong tendency to focus on the implications of breaking down linear causality, without paying much attention to the implications of temporal scale in the demolition of the doctrine of large-large (see Roth and Ryckman 1995; Shermer 1995). Indeed, like McGlade (Chapter 9, this volume) I too find Shermer's account of the doctrine of contingent necessity to be suggestive and interesting, but I remain unclear about the ability of archaeological records to support the reconstruction of 'initial conditions' in the ways required by non-linear modelling (see e.g. Shermer 1995:66ff.). In this sense while it is quite possible that the blocks of time required to create a narrative sequence can be delivered, the temporality of the minimum chronological units and the temporality of the resultant narrative have to be symmetrical, if historians or archaeologists are to evaluate potential narratives against the data they purport to account for (see Murray 1997). Thus far this has not happened.

This brief discussion of the implications of absolute time and of an improved

understanding of archaeological site formation processes has been intended to support the view that the empirical character of the archaeological record poses much more than methodological problems for the application of contemporary social theory to archaeology. It has also sought to support a view that the application of what passes for 'processual' theory to archaeology is similarly troubled. I have previously argued (see Murray 1987, 1993, 1996, 1997, in press) that the issues raised by the creation of an archaeological record which is not the subject of conventional understandings, exposes a chasm between the cultural traditions of archaeology and our ability to articulate convincingly those traditions in modern practice. Although it is easy to state that the task of modern theory-building in archaeology is to find a way of articulating theory with a better understanding of the structural properties of archaeological phenomena, the implications of this perspective have proved very hard for the bulk of practitioners to accept.

This is made all the more difficult when practitioners insist that for archaeology to be relevant to human affairs it must adopt the problematics of modern social theory, without recognizing that an uncritical translation of such perspectives can (and frequently does) ignore the nature of the empirical information such theories are supposed to explain. It is also worth noting that archaeology has at least the potential to profoundly affect the terms in which we seek an understanding of humanity in one of two (related) ways. First, by describing a new constellation of phenomena which have the capacity to inform us about human history and human nature, thus expanding the potential coverage of contemporary social theory. Second, through an analysis of the ability of such theories to solve puzzles and problems raised by these new phenomena, to ascertain how (or whether) contemporary social theory can be transformed by its encounter with archaeology (see e.g. Murray 1997).

While many archaeologists would agree with Barrett (1994:170) that the archaeological record is not infinitely malleable and that we should accept its power to constrain interpretation, there is a considerable disparity of view about how much constraint archaeologists should accept (see Wylie 1995). For some, constraint, as I have argued above, is seen as having great benefit in that it can assist us to evaluate the theoretical and conceptual inheritance of our discipline. Others, such as Squair, see it negatively in the sense that it can weaken the plausibility of favoured ways of seeing the world, making archaeological knowledge problematic in its relationship to other sources of knowledge about people. Some of this latter group will never be convinced, but there is no a priori necessity that contemporary social theory (if it remains unchanged through its application to archaeological phenomena) has to be the benchmark of an interaction between archaeology and the other human sciences.

Leaving aside understandable fears about the consequence of changing a familiar relationship between past and present, there is no doubt that if change occurs it will be slow and partial, but hopefully it will be cumulative. The scale and intensity of the influence of the present on our encounter with the archaeological past means that a consideration of the implications of the power of

the archaeological record to constrain interpretation is only the first step on a very long journey, and that we should avoid as much as possible the tendency to be overwhelmed by the dangers of replacing conventional modes of understanding with others as yet unthought or untried. As Isaiah Berlin long ago noted, really fundamental changes in perspective happen, but they do not happen quickly because to question all fundamentals would be to drive us mad:

The true reason for accepting the propositions that I live on earth, and that an Emperor Napoleon I existed, is that to assert their contradictories is to destroy too much of what we take for granted about the present and the past. Any given generalisation may be capable of being tested or refined by inductive or other scientific tests; but we accept the total texture, compounded as it is by literally countless strands—including both general and particular beliefs—without the possibility, even in principle, of any test for it in its totality. For the total texture is what we begin and end with. There is no Archimedean point outside it whence we can survey the whole of it and pronounce upon it.

(Berlin 1980:114)

But there is a basis on which we can begin critically to evaluate those concepts and categories which drive modern archaeology, and it stems from the exercise of two things: first, a recognition that we need to be committed to the maintenance of societies which are not based on prejudice, ignorance, the blind following of tradition and coercion, and that we need to confront our assumptions about the world in the hope of learning more about it (and them); second, the application of practical reasoning in archaeology through archaeologists building theories and 'trying them out'. Fifteen years ago Alison Wylie described the process of such practical reasoning with respect to the development of a structuralist archaeology (1982:45). Her account applies equally well today.

Thus the challenge of time and structure exists in a way which cannot and must not be brushed aside as being simply contingent on social practice. Archaeologists can meet this challenge, but it will require a general recognition that the cultural traditions of archaeology should be prised open, and that a deeper critical self-reflection should begin.

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## 2 *Indian and other concepts of time: a holistic framework*

D.P.AGRAWAL, V.BHALAKIA AND S.  
KUSUMGAR

### INTRODUCTION

In this chapter we discuss various concepts of time and their cultural biases, including those of Indian philosophical systems, in some detail. Time is all-pervasive in archaeological and evolutionary processes and we attempt to locate a connecting matrix of time so as to encompass physical, biological, archaeological processes, and even the Prigoginian world of dissipative structures. This analysis of time may in fact provide a holistic philosophy of archaeology, a synthesis of all the schools and a bridge between history, biology, cosmology, moving us towards a theory of everything.

There are obvious cultural biases which condition concepts of time. These biases are more difficult to pinpoint although they may help us to characterize cultures. Despite the growing recognition that cultural conceptions of time differ, the social sciences have developed little in the way of a coherent theory of time. Toffler hopes that 'such a theory might reach across many disciplines, from politics to group dynamics and interpersonal psychology' (1984:xviii), taking into account what in *Future Shock* he called 'durational expectancies'—our culturally induced assumptions about how long certain processes are supposed to take. Our goal in this chapter is to look at the concept of time more broadly, at its all-pervasive role in archaeological and evolutionary processes, thereby making a contribution towards the development of a 'theory of everything' (Agrawal 1979, 1992, 1993, in press).

Prigogine has realized the potential of a common meaning of time which will cut across the disciplines. He asks:

how we can relate the various meanings of time—time as motion, as in dynamics; time related to irreversibility, as in thermodynamics; time as history, as in biology and in sociology.... To reach a coherent view of the world of which we are part.... We must find some way to pass from one description to another.... After all we are living in a single universe.

(Prigogine and Stengers 1984:xii)

A holistic theory of time can not only provide a theory of archaeology, what Lamberg-Karlovsky (1989) calls a 'seamless totality', but it could also start the development of a universal theory of time and a theory of everything. We need not be over-awed by physical theories, because, even there, 'our picture of physical reality, particularly in relation to time, is due for a grand shake-up' (Penrose 1989:480). We discuss these broader issues towards the end of the chapter.

We begin with a discussion of the cultural conditioning of concepts of time and analyse Indian philosophical schools and their theories of time. We also discuss the arrow of time in earliest societies. Following this we consider how time pervades technological and biological evolution and how the advance of modern physical dating methods has brought the universe, earth and human origins to a finite time-frame within a few orders of magnitude of each other.

## ARCHAEOLOGY AND TIME

Time is the all-pervading matrix in which various archaeological processes are embedded. Graham Clark described the archaeological record as a continuous acceleration of the tempo of technological change, with more happening in the last 200 than during the previous 50,000 years, and more in the last 50,000 years than the last 2 million (Clark 1977:xv). Technology has always determined social structure, according to Marx, Gordon Childe and others, with fast technological change generating a lot of stress on the processes of social change. Toffler painted the grim picture of a world with runaway technological changes in *Future Shock* (1970).

Is the stone age record deceptive? Is it possible that the same acheulian axe was used for hundreds of thousands of years but its functions kept on changing? If this is so then the tempo of change may not be exponential but linear, and social changes could thus keep pace with linear changes. Time is an omnipotent factor in the understanding of both past and present. Then there is the enigmatic efflorescence of tool types and morphology around 40,000 years ago. It seems that suddenly many standardized types of tools were invented which were both efficient and elegant. The suspected cause of this efflorescence was the invention of language and speech. But the question remains: what causes technological change and affects its tempo?

From the observations of nature and the stars early human beings must have been conscious of the cycle of seasons, diurnal rhythm, star configurations, winter and summer solstices, and birth and death. If at that point in human history our sense of deep time was cyclical in nature, it is only to be expected. On the other hand, the discovery of fire helped human beings break the tyranny of diurnal rhythm—they could now work late into the night. The discovery of irrigation technology, calendars, etc. freed people from the tyranny of cyclical phenomena. It can thus be argued that technological changes straightened the arrow of time for early humans (Agrawal 1994).

During the course of human history people were also freed from oestrial

rhythms. They did not have to mate compulsively during a particular period, and in the animal kingdom humans are uniquely free from this natural rhythm. The obvious selective advantage of this change in behaviour is that both men and women could look after children. Only the human infant requires protection and feeding for at least five years. Freedom from oestriol urges thus conferred many evolutionary advantages both as to raising progeny and with regard to better social bonding.

It is said that all animals exist in time and are changed by it, but that only people (because of the power of language) can manipulate it. However, even apes have the ability to manipulate the present to obtain a future goal. For example a chimp can stack four boxes one above the other to reach a hanging banana, or strip a twig from a tree to make a probe to extract termites from an ant-hill. Basically, these are responses to deal with a future which is immediate and visible and not far away and hence foreseeable. Like the chimps, *Australopithecus* also made chopper-like stone tools perhaps to meet an immediate need, a visible future. At some stage hominids started planning for the future—to make tools for a distant future need—which required thinking, planning, language and, of course, the manipulation of time.

Chinese *Homo erectus* invented fire about 400,000 years ago. Humans were provident enough to keep supplies of fuel on hand and skilful enough to keep the fire going. Eventually, people could use words not only for communication, but also for moving things in time. Now parents could leisurely instruct children, in the security of their own cave, about how to manage a charging bull or a mammoth without waiting for the actual event. It is obvious that the human need to tackle time—to provide for future needs and exigencies—was concomitant with the evolution of our mental faculties: memory, intelligence, language. We will now discuss how cultural biases condition concepts of time.

## CULTURAL CONDITIONING OF THE CONCEPT OF TIME

Toffler in his foreword to *Order out of Chaos* (Prigogine and Stengers 1984:xii) emphasizes cultural differences in the concept of time. For example, durational expectancies are culturally induced assumptions about how long certain processes are supposed to take. There are differences in the time bias of different cultures depending upon the degree to which such cultures place emphasis on past, present or future. Toffler has also shown that different cultures conceive of time differently. For some, time is cyclical, for others it is a straight arrow from the past to the future, and there are still others who conceive of human life as stationary with the future advancing towards them.

There are other cultural differences in the concept of time. For example, western civilization had a biblical genealogy which barely a century ago held that the universe and human beings were created in 4004 BC. There was even a date and time for creation. As late as the late 1850s this concept proved to be a barrier to scientific progress. Anyone discussing the antiquity of fossils and sediments

beyond this date was ridiculed by the religious establishment. Indians have a deep sense of time. Some of their mythical figures had millions of years of life-spans. The age of some Bodhisattvas was  $10^{32}$  years—far beyond the age of the universe. Puranic descriptions of historic dynasties are so confusing that they provide ample ground for controversies. In contrast, Chinese time-keeping was so accurate that even the dates for their kings of the third millennium BC are correct to  $\pm$ one year. Such accurate records have helped to date supernovas and the reappearance of comets. Indians were traditionally more concerned with the nature of time than with its direction, except where the Yugas were concerned. The Yugas were cyclical and represented cycles of birth and destruction of the universe.

### TIME IN INDIAN PHILOSOPHY

Time in Indian philosophy is interrelated with basic concepts of being and becoming, change and causality, creation and annihilation. The different views of time in Indian philosophy can only be grasped in the framework of the general scheme of thought—in all its metaphysical, logical and epistemological aspects (Neogi Balslev 1983). The earliest and predominant philosophical tradition in India is Brahmanism, with its roots in the Vedas and Upanishads. The most pervasive and important idea in Brahmanical philosophy is that of the identical, immutable reality underlying all change and becoming. This is the core of the *atmavada* of the Upanishads. The oldest Brahmanical school, Sankhya, set up a dualistic metaphysics, tracing the whole course of the universe to an interplay of two ultimate principles—*purusa* and *prakriti*. *Purusa* is the unchanging principle of consciousness, *prakriti* the ever-changing principle of matter. The inherent tension present in the Sankhya metaphysical idea of two reals led eventually to the rise of the pluralistic metaphysics of the Nyaya-Vaisesika schools on one hand, and to the development of the philosophy of non-dualism via the monistic metaphysics of the Uttara-Mimamsa on the other.

The Buddhist tradition denied the *atmavada* tradition of the ultimate real as unchanging and unchangeable. By contrast Buddhist philosophy is termed *anatmavada*, which conceives the ultimate principle as dynamic. Everything is in a state of flux; there is absolutely nothing which remains immutable. Change is total. The substance view (*atmavada*) and the modal view (*anatmavada*) are entirely opposed to one another. One has a static view, the other a dynamic one. One champions the doctrine of soul, the other is a doctrine which denies the soul.

The six principal schools that developed in the Brahmanical tradition are Sankhya, Yoga, Nyaya, Vaisesika, Purva-Mimamsa and Uttara-Mimamsa. They formulate and explain the phenomenon of change in diverse ways. The oldest school, Sankhya, is atheistic (Neogi Balslev 1983). The Yoga system is, however, theistic. The Sankhya and Yoga schools operate with two ultimate principles which are conceived as having no beginning or end, and as being independent of

one another. The Yoga school of philosophy occupies itself with the question of time and develops its specific stand on the reality of the instant and the merely subjective construction of sequence. The Yoga school states firmly that the moment is real, whereas the idea of a unitary objective time either as a collection of moments or as an objective series is a subjective representation devoid of reality. No two moments can exist simultaneously. In Sankhya, however, *prakriti* as time personified is a conception of time as eternal, i.e. without beginning or end, tending more towards time which is unitary than as discrete. In that case, the instant is only an abstraction. This school holds the empirical time-phases of past, present and future to be equivalent to the sub-latent, actual and potential states of an entity in question. In other words, the time-phases refer to that aspect of evolution which breaks through the homogeneous forces of self-reproduction bringing forth the heterogeneous categories of existence. Emergence as present, dissolution as past and the potential as future can thus account for conventional, temporal usages without having to grant time a distinct existence per se, as the Nyaya-Vaisesikas would have it.

The Nyaya-Vaisesika philosophers, however, conceive of time as a category of existence, that one could talk about as having causal operation or power. In this system time is granted an ontological status. In Advaita-Vedanta there is no room for plurality and movement. The problem of creation and the problem of time are reduced here to problems of appearance. The Nyaya-Vaisesika philosophers are aware of the inherent distinction between space and time. It is interesting to know that the temporal order of events as such does not allow for reversibility or inversion (*niyata*). This is the closest that a Brahmanical school comes to talking about reversibility and the arrow of time. In this school, space and time are considered as substances. The idea of absolute time is challenged not only by Buddhist and Jain philosophers, but also by the Brahmanical schools of Sankhya, Yoga and Advait-Vedanta.

To sum up, in *vivartavada* (the Advait-Vedanta theory of the effect being no different than the cause), time is an appearance, i.e. it has no ontological reality; in *parinamvada* (theory of becoming), change is ontological but time is no independent ontological category. In *arambhavada* (theory of causality) time is real per se, the very presupposition of the reality of change. In the Sankhya system, time is conceived as independent of change. Change is conceived not in abstraction but as a concrete becoming. The notions of temporal sequence as past, present and future are to be understood in the perspective of heterogeneous manifestations of *prakriti*.

There is a debate between the Mimamsa and Nyaya-Vaisesika schools as to how time is known. The former held that time is perceived whereas the latter maintained that time is inferred. The so-called perceived time as a qualifying element is of course a case of extraordinary perception. But in all cases, it is only inference that can establish ubiquitous, unitary, all-pervading time.

The second principal Indian philosophical tradition is Buddhism. Unlike Brahmanism, it does not owe its origin to any sacred scripture. It owes its inspiration entirely to the experience and teaching of Gautama Buddha. Buddhism

holds that there is nothing which remains identical and immutable. Buddhists renounce all conceptions of being as permanent, as immutable, as substance and as universal and reject all ideas about time as unitary, as an all-embracing receptacle and as a real per se. Buddhists believe that without exception everything is subject to change. Buddhist philosophers of all the three periods maintain that the real is momentary. For them the real time is instant. The idea of time as a real per se is rejected through a refutation of the ideas of duration and continuity. That which is real/existent must be causally efficient, and it is only the instantaneous which can be so. Time as instant again indicates this ever-fluctuating, evanescent character of being with which it is fused ontologically. Being, time and causality are a conceptual whole in the Buddhist philosophy. Buddhism rejects the idea of universal time—the instant alone is real. There is no room for any unchanging substance, no category of reality as without beginning and end (i.e. *nitya*). Change is total.

Indian Buddhism is divided into three periods. The no-soul, no-substance theories dominate early Buddhism. The process of perpetual becoming is not accidental or haphazard but governed by the law of dependent origination. The early period is known as Hinayana Buddhism, the most important schools being Theravada, Vaibhasika and Sautrantika. The second phase of Buddhism saw the rise of the Madhyamika school. The last phase of Buddhism maintains the absolute reality of consciousness as against the Madhyamika thesis, that consciousness and object are relative to each other and therefore both are unreal.

In contrast to Brahmanism and Buddhism, Jainism seeks to set up a many-sided view of reality. It aims at formulating a conception of reality which can accommodate both identity and difference, permanence and change. The Jain school attempts to avoid the extreme one-sided views that gave rise to a distinct conception of the real. Origin, decay and permanence are the characteristics of the real. This three-fold conception plays an important role in Jain metaphysics, which is one of realistic pluralism. *Dravya* and *Astikaya* are the two important terms which focus on the Jain view of time, along with its similarities and differences from other substances. *Dravya* or substance is that which possesses quality and modes. It lists six substances as ultimately real, of which one is time. The six *dravyas* that are listed as metaphysically real are the soul/conscious substance, matter, the principle of motion, the principle of rest, space and time. Among the six *dravyas*, five are called *astikayas* which exist and have magnitude/bodies.

Jainism propounds an atomic conception of time. The characteristic of the time atoms is that they are distinct and can never be mixed up, they can never be combined, constituting a mono-dimensional series which is unilateral. Absolute time in Jainism exists and is potent, in that it causes changes in the other substances. Birth, growth and decay of things are due to its influence. Jainism accepts the reality of change which in turn points to the reality of time. In the Jain school time has no corpus (*Kayatva*) or extension, and is generated by a mono-dimensional series of time atoms which is unilateral (approximating to the notion of a unidirectional arrow of time). In Jainism therefore the very changes which



determine the use of conventional time are themselves the effects of absolute time. Absolute time, consisting of instants, is conceived as having no beginning or end, whereas conventional time has both. The instants arranged unilaterally are conceived as permanent, i.e. without beginning or end. The Jains thus propound an atomic pluralist view of time where time is real and absolute but not unitary. Time as instant is real, but these instants are present in a linear order.

The above account gives a glimpse of the various schools of Indian philosophy with regard to their concepts of time. Buddhist and Jain schools appeared in revolt against the ritualism of Brahmanism. The former represented the new agricultural and trading classes, while the latter symbolized the ancient nomadic-pastoral order. Brahmanic schools are understandably against any change—social or economic. They invoke the timeless revealed authority and their philosophy lays great emphasis on changelessness, whereas to the Buddhists and Jains nothing was sacrosanct or changeless. In Buddhism, for example, everything was in a state of flux. Their respective concepts of time are thus biased by their socioeconomic interests, as well as by their philosophic systems. It is not only cultural bias that has a role to play in moulding concepts of time, but socio-economic interests as well. Modern science has also affected our concepts of deep time in ways which are briefly outlined below.

## FINITE TIME

Radiometric dating brought about a revolution in our concept of time. The universe no longer appears to be infinitely old. Even on a relative scale, the origins of humans, life, earth and the universe differ only by a few orders of magnitude. Today we believe that the universe began only 15–20 billion years ago; the earth about 4.5 billion years ago, life on earth around 3 billion years ago; and hominids themselves about 3 million years ago.

## GENETIC DISTANCE AND EVOLUTION

Molecular biologists have estimated that the evolutionary bifurcation distance between primate species is double their genetic distance. For example, oranges and chimps diverged from each other around 12–16 million years ago and their genetic difference is 3.6 per cent. Our genetic difference from the chimps is only about 1.6 per cent which is only half the genetic difference between oranges and chimps. Therefore the chimp and hominid species must have diverged only round 6 million years ago.

Evolution has been accelerated by technological change. The earliest tool-making human, *Homo habilis*, dates to 2.5 million years ago. *Homo habilis*, is associated with the block-and-block technique (Oldovan); *Homo erectus* with the flaking and Levallois techniques; and *Homo sapiens*, our species, is associated with the crested-guided-ridge. There appears to be a relationship between technological

change and evolution, with some sort of temporal laws determining not only relationships between genetic difference and evolutionary distance, but also relationships between neuro-biological evolution and the emergence of new human species and technological progress. However, if the pace of primate and human speciation is continuously accelerated, and since *Homo sapiens* has been around for the last 100,000 years, the pace of technological development is accelerating the tempo of human evolution, should we expect the evolution of a new human species generated by the modern high-tech revolution?

Leaving archaeology here, let us have a look at the universe described by Hawking and Prigogine to explore some bridges which will connect archaeology and the physical universe via time.

### TIME, PHYSICS AND DISSIPATIVE STRUCTURES

The laws of science do not distinguish between the forward and backward directions of time. However, there are at least three arrows of time that do distinguish the past from the future. They are:

the thermodynamic arrow, the direction of time in which disorder increases; the psychological arrow, the direction of time in which we remember the past and not the future; and the cosmological arrow, the direction of time in which the universe expands rather than contracts.... The no boundary proposal for the universe predicts the existence of a well defined thermodynamic arrow of time because the universe must start off in a smooth and ordered state. And the reason we observe this thermodynamic arrow to agree with the cosmological arrow is that intelligent beings can exist only in the expanding phase.

(Hawking 1988:145)

But entropy is not merely a downward slide toward disorganization: 'under certain conditions, entropy itself becomes progenitor of order'. Here we begin to glimpse, in full richness, the monumental synthesis proposed by Prigogine. By insisting that irreversible time is not a mere aberration, but a characteristic of much of the universe, classical dynamics are subverted. For Prigogine and Stengers (1984), it is not a case of either/or. Of course, reversibility still applies (at least for sufficiently long times)—but in closed systems only. Irreversibility applies to the rest of the universe. Under non-equilibrium conditions at least, entropy may produce rather than degrade order, organization and therefore life. This is a new relationship between chance and necessity. Thus new efforts have been made by Prigogine to recognize the co-presence of both chance and necessity, not with one subordinate to the other, but as full partners in a universe that is simultaneously organizing and de-organizing itself (Toffler, in Prigogine and Stengers 1984:xii).

When fluctuations force an existing system into a far-from-equilibrium

condition and threaten structure, the system approaches a critical moment or bifurcation point. At this point, it is inherently impossible to determine in advance the next state of the system. Chance nudges what remains of the system down a new path of development. And since this path is chosen (from among many), determinism takes over again until the next bifurcation point is reached. Chance and necessity, in the Prigoginian framework, are not irreconcilable opposites, but each plays its role as a partner in destiny.

Toffler (1984:xxvi) extrapolates the Prigoginian laws to social changes and says:

applying their own terminology, we might characterise today's breakdown of industrial or Second Wave society as civilisational 'bifurcation', and the rise of a more differentiated, Third Wave society, as a leap to a new 'dissipative structure' on a world scale. For if Prigogine and Stengers are right that chance plays its role at or near the point of bifurcation, after which, deterministic processes take over once more until the next bifurcation, are they not embedding chance itself, within a deterministic framework? By assigning a particular role to chance don't they de-chance it?

## CONCLUSIONS

In this chapter we have discussed various concepts of time, including those of ancient Indian philosophical systems and their cultural and socio-economic biases. We have also discussed the all-pervasive role of time in archaeological and evolutionary processes. We have suggested that the matrix of time may provide a holistic theory not only of archaeology, but also of 'a theory of everything'. Physicists, including those of the Prigoginian school, are exploring such possibilities, and it may be worthwhile to meet them half-way with a comprehensive cultural theory of time. Extrapolating Toffler's use of the Prigoginian concepts in civilizational processes, we can perhaps interpret each major cultural collapse as a 'bifurcation point', and the emergence of a new culture based on a new technology as a new dissipative structure. Let us repeat Prigogine: 'to reach a coherent view of the world of which we are part... we must pass from one description [of time] into others.... After all we are living in a single universe.'

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### 3 *Puranic time and the archaeological record*

MICHAEL A. CREMO

The time concept of modern archaeology, and modern anthropology in general, resembles the general cosmological-historical time concept of Europe's Judeo-Christian culture. Differing from the cyclical cosmological-historical time concepts of the early Greeks in Europe, and the Indians and others in Asia, the Judeo-Christian cosmological-historical time concept is linear and progressive. Modern archaeology also shares with Judeo-Christian theology the idea that humans appear after the other major species.

The author subjectively positions himself within the Vaisnava Hindu world view, and from this perspective offers a radical critique of modern generalizations about human origins and antiquity. Hindu historical literatures, particularly the Puranas and Itihasas, place human existence in the context of repeating time cycles called *yugas* and *kalpas*, lasting hundreds of millions of years. During this entire time, according to the Puranic accounts, humans coexisted with creatures in some ways resembling the earlier tool-making hominids of modern evolutionary accounts. If one were to take the Puranic record as objectively true, and also take into account the generally admitted imperfection and complexity of the archaeological and anthropological record, one could make the following prediction. The strata of the earth, extending back hundreds of millions of years, should yield a bewildering mixture of hominid bones, some anatomically modern human and some not, as well as a similarly bewildering variety of artefacts, some displaying a high level of artistry and others not. Given the linear progressivist preconceptions of generations of archaeologists and anthropologists, one could also predict that this mixture of bones and artefacts would be edited to conform to their deeply rooted linear-progressive time concepts. A careful study of the archaeological record, and the history of archaeology itself, broadly confirms these two predictions. Linear-progressivist time concepts thus pose a substantial barrier to truly objective evaluation of the archaeological record and to rational theory-building in the area of human origins and antiquity.

The practically employed time concept of the modern historical scientist, including the archaeologist, strikingly resembles the traditional Judeo-Christian time concept. And it strikingly differs from that of the ancient Greeks and Indians.

This observation is, of course, an extreme generalization. In any culture, the common people may make use of various time concepts, linear and cyclical. And among the great thinkers of any given period, there may be many competing views of both cyclical and linear time. This was certainly true of the ancient Greeks. It can nevertheless be safely said that the cosmological concepts of several of the most prominent Greek thinkers involved a cyclic or episodic time similar to that found in the Puranic literatures of India. For example, we find in Hesiod's *Works and Days* (129–234) a series of ages (gold, silver, bronze, heroic and iron) similar to the Indian *yugas*. In both systems, the quality of human life gets progressively worse with each passing age. In *On Nature* (Fragment 17), Empedocles speaks of cosmic time cycles. In Plato's dialogues there are descriptions of revolving time (*Timaeus* 38 a) and recurring catastrophes that destroy or nearly destroy human civilization (*Politicus* 268 d ff.). Aristotle said in many places in his works that the arts and sciences had been discovered many times in the past (*Metaphysics* 1074 b 10, *Politics* 1329 b 25). In the teachings of Pythagoras, Plato and Empedocles, regarding transmigration of souls, this cyclical pattern is extended to individual, psychophysical existence.

When Judeo-Christian civilization arose in Europe, another kind of time became prominent. This time has been characterized as linear and vectorial. Broadly speaking, this time concept involves a unique act of cosmic creation, a unique appearance of the human kind, and a unique history of salvation, culminating in a unique denouement in the form of a last judgement. The drama occurs only once. Individually, human life mirrored this process; with some exceptions, orthodox Christian theologians did not accept transmigration of the soul.

Modern historical sciences share the basic Judeo-Christian assumptions about time. The universe we inhabit is a unique occurrence. Humans have arisen once on this planet. The history of our ancestors is regarded as a unique though unpredestined evolutionary pathway. The future pathway of our species is also unique. Although this pathway is officially unpredictable, the myths of science project a possible overcoming of death by biomedical science and mastery over the entire universe by evolving, space-travelling humans. One group, the Santa Fe Institute, sponsor of several conferences on 'artificial life', predicts the transferral of human intelligence into machines and computers displaying the complex symptoms of living things (Langton 1991:xv). 'Artificial life' thus becomes the ultimate transfiguring salvation of our species.

One is tempted to propose that the modern human evolutionary account is a Judeo-Christian heterodoxy, which covertly retains fundamental structures of Judeo-Christian cosmology, salvation history and eschatology while overtly dispensing with the scriptural account of divine intervention in the origin of species, including our own. This is similar to the case of Buddhism as Hindu heterodoxy. Dispensing with the Hindu scriptures and God concepts, Buddhism

nevertheless retained basic Hindu cosmological assumptions such as cyclical time, transmigration and *karma*.

Another thing the modern human evolutionary account has in common with the earlier Christian account is that humans appear after the other life forms. In Genesis, God creates the plants, animals and birds before human beings. For strict literalists, the time interval is short—humans are created on the last of six of our present solar days. Others have taken the Genesis days as ages. For example, around the time of Darwin, European scientists with strong Christian leanings proposed that God had gradually brought into existence various species throughout the ages of geological time until the perfected earth was ready to receive human beings (Grayson 1983). In modern evolutionary accounts, anatomically modern humans retain their position as the most recent major species to occur on this planet, having evolved from preceding hominids within the past 100,000 or so years. And despite the attempts of prominent evolutionary theorists and spokespersons to counteract the tendency, even among evolution scientists, to express this appearance in teleological fashion (Gould 1977:14), the idea that humans are the crowning glory of the evolutionary process still has a strong hold on both the public and scientific minds. Although anatomically modern humans are given an age of about 100,000 years, modern archaeologists and anthropologists, in common with Judeo-Christian accounts, give civilization an age of a few thousand years, and, again in common with Judeo-Christian accounts, place its earliest occurrence in the Middle East.

I do not here categorically assert a direct causal link between earlier Judeo-Christian ideas and those of the modern historical sciences. Demonstrating that, as Edward B. Davis (1994) points out in his review of recent works on this subject, needs much more careful documentation than has yet been provided. But the many common features of the time concepts of the two knowledge systems suggest these causal links do exist, and that it would be fruitful to trace connections in sufficient detail to satisfactorily demonstrate this.

I do, however, propose that the tacitly accepted and hence critically unexamined time concepts of the modern human sciences, whether or not causally linked with Judeo-Christian concepts, pose a significant unrecognized influence on interpretation of the archaeological and anthropological record. To demonstrate how this might be true, I shall introduce my own experience in evaluating this record from the alien standpoint of the cyclical time concepts and accounts of human origins found in the Puranas and Itihasas of India.

My subjective path of learning has led me to take the Vaisnava tradition of India as my primary guide to life and the study of the visible universe and what may lie beyond. For the past century or so, it has been considered quite unreasonable to bring concepts from religious texts directly into the realm of the scientific study of nature. Indeed, many introductory anthropology and archaeology texts make a clear distinction between 'scientific' and 'religious' ways of knowing, relegating the latter to the status of unsupported belief, with little or no utility in the objective study of nature (see, for example, Stein and Rowe 1993:2). Some texts even go so far as to boast that this view has been upheld by the United States Supreme Court (Stein

and Rowe 1993:37), as if the state were the best and final arbiter of intellectual controversy. But I propose that total hostility to religious views of nature in science is unreasonable, especially for the modern historical sciences. Despite their pretensions to areligious objectivity, practitioners unconsciously retain or incorporate into their workings many Judeo-Christian cosmological concepts, especially concerning time, and implicitly employ them in their day-to-day work of observation and theory-building. In this sense, modern evolutionists share some intellectual territory with their fundamentalist Christian antagonists.

But there are other ways to comprehend historical processes in nature. How this is so can be graphically sensed if one performs the mental experiment of looking at the world from a radically different time perspective—the Puranic time concept of India. I am not alone in suggesting this. Gene Sager, a professor of philosophy and religious studies at Palomar College in California, wrote in an unpublished review of my book *Forbidden Archaeology* (Cremo and Thompson 1993):

As a scholar in the field of comparative religion, I have sometimes challenged scientists by offering a cyclical or spiral model for studying human history, based on the Vedic concept of the *kalpa*. Few western scientists are open to the possibility of sorting out the data in terms of such a model. I am not proposing that the Vedic model is true.... However, the question remains, does the relatively short, linear model prove to be adequate? I believe *Forbidden Archaeology* offers a well researched challenge. If we are to meet this challenge, we need to practice open mindedness and proceed in a cross-cultural, interdisciplinary fashion.

(personal communication, 1993)

This cyclical time of the Puranas operates only within the material cosmos. Beyond the material cosmos lies the spiritual sky, or *brahmajyoti*. Innumerable spiritual planets float in this spiritual sky, where material time, in the form of *yuga* cycles, does not act.

Each *yuga* cycle is composed of four *yugas*. The first, the Satya-yuga lasts 4,800 years of the demigods. The second, the Treta-yuga, lasts 3,600 years of the demigods. The third, the Dvapara-yuga, lasts 2,400 years of the demigods. And the fourth, Kali-yuga, lasts 1,200 years of the demigods (*Bhagavata Purana* 3.11.19). Since the demigod year is equivalent to 360 earth years (Bhaktivedanta Swami 1973:102), the lengths of the *yugas* in earth years are, according to standard Vaisnava commentaries, 432,000 years for the Kali-yuga, 864,000 years for the Dvapara-yuga, 1,296,000 years for the Treta-yuga, and 1,728,000 years for the Satya-yuga. This gives a total of 4,320,000 years for the entire *yuga* cycle. One thousand such cycles, lasting 4,320,000,000 years, comprises one day of Brahma, the demigod who governs this universe. A day of Brahma is also called a *kalpa*. Each of Brahma's nights lasts a similar period of time. Life is only manifest on earth during the day of Brahma. With the onset of Brahma's night, the entire



universe is devastated and plunged into darkness. When another day of Brahma begins, life again becomes manifest.

Each day of Brahma is divided into fourteen *manvantara* periods, each one lasting 71 *yuga* cycles. Preceding the first and following each *manvantara* period is a juncture (*sandhya*) the length of a Satya-yuga (1,728,000) years. Typically, each *manvantara* period ends with a partial devastation. According to Puranic accounts, we are now in the twenty-eighth *yuga* cycle of the seventh *manvantara* period of the present day of Brahma. This would give the inhabited earth an age of 2.0 billion years. Interestingly enough, the oldest undisputed organisms recognized by palaeontologists—algae fossils such as those from the Gunflint formation in Canada—are just about that old (Stewart 1983:30). Altogether, 453 *yuga* cycles have elapsed since this day of Brahma began. Each *yuga* cycle involves a progression from a golden age of peace and spiritual progress to a final age of violence and spiritual degradation. At the end of each Kali-yuga, the earth is practically depopulated.

During the *yuga* cycles, human species coexist with other human-like species. For example, in the *Bhagavata Purana* (9.10.20) we find the divine *avatara* Ramacandra conquering Ravana's kingdom Lanka with the aid of intelligent forest-dwelling monkey-men who fought Ravana's well-equipped soldiers with trees and stones. This occurred in the Treta-yuga, about 1 million years ago.

Given the cycle of *yugas*, the periodic devastations at the end of each *manvantara*, and the coexistence of civilized human beings with creatures in some ways resembling the human ancestors of modern evolutionary accounts, what predictions might the Puranic account give regarding the archaeological record? Before answering this question, we must also consider the general imperfection of the fossil record (Raup and Stanley 1971). Hominid fossils in particular are extremely rare. Furthermore, only a small fraction of the sedimentary layers deposited during the course of the earth's history have survived erosion and other destructive geological processes (Van Andel 1981).

Taking the above into account, I propose the Puranic view of time and history predicts a sparse but bewildering mixture of hominid fossils, some anatomically modern and some not, going back tens and even hundreds of millions of years and occurring at locations all over the world. It also predicts a more numerous but similarly bewildering mixture of stone tools and other artefacts, some showing a high level of technical ability and others not. And, given the cognitive biases of the majority of workers in the fields of archaeology and anthropology over the past 150 years, we might also predict that this bewildering mixture of fossils and artefacts would be edited to conform with a linear, progressive view of human origins. A careful investigation of published reports, by myself and Richard Thompson (1993), offers confirmation of these two predictions. What follows is only a sample of the total body of evidence catalogued in our lengthy book. The citations given are for the single reports that best identify particular finds. Detailed analysis and

additional reports cited elsewhere (Cremo and Thompson 1993) offer strong confirmation of the authenticity and antiquity of these discoveries.

Incised and carved mammal bones are reported from the Pliocene (Desnoyers 1863; Laussedat 1868; Capellini 1877) and Miocene (Garrigou and Filhol 1868; von Dürcker 1873). Additional reports of incised bones from the Pliocene and Miocene may be found in an extensive review by the overly sceptical de Mortillet (1883). Scientists have also reported pierced shark teeth from the Pliocene (Charlesworth 1873), artistically carved bone from the Miocene (Calvert 1874) and artistically carved shell from the Pliocene (Stopes 1881). Carved mammal bones reported by Moir (1917) could be as old as the Eocene.

Very crude stone tools occur in the Middle Pliocene (Prestwich 1892) and from perhaps as far back as the Eocene (Breuil 1910: especially 402; Moir 1927). One will note that most of these discoveries are from the nineteenth century. But such artefacts are still being found. Crude stone tools have recently been reported from the Pliocene of Pakistan (Bunney 1987), Siberia (Daniloff and Kopf 1986) and India (Sankhyan 1981). Given the current view that tool-making hominids did not leave their African centre of origin until about 1 million years ago, these artefacts are somewhat anomalous, not to speak of a pebble tool from the Miocene of India (Prasad 1982).

More advanced stone tools occur in the Oligocene of Europe (Rutot 1907), the Miocene of Europe (Bourgeois 1873; Ribeiro 1873; Verworn 1905), the Miocene of Asia (Noetling 1894) and the Pliocene of South America (F. Ameghino 1908, C. Ameghino 1915). In North America, advanced stone tools occur in Californian deposits ranging from Pliocene to Miocene in age (Whitney 1880). An interesting slingstone, at least Pliocene and perhaps Eocene in age, comes from England (Moir 1929:63).

More advanced artefacts have also been reported in scientific and nonscientific publications. These include an iron nail in Devonian sandstone (Brewster 1844), a gold thread in carboniferous stone (*Times of London* 22 June 1844), a metallic vase in pre-cambrian stone (*Scientific American* 5 June 1852) and a chalk ball from the Eocene (Melleville 1862), a Pliocene clay statue (Wright 1912:266–9), metallic tubes in Cretaceous chalk (Corliss 1978:652–3), and a grooved metallic sphere from the Pre-Cambrian (Jimison 1982). The following objects have been reported from carboniferous coal: a gold chain (*The Morrisonville Times*, Illinois, USA, 11 June 1891), artistically carved stone (*Daily News of Omaha*, USA, 2 April 1897), an iron cup (Rusch 1971) and stone block walls (Steiger 1979:27).

Human skeletal remains described as anatomically modern occur in the Middle Pleistocene of Europe (Bertrand 1868; de Mortillet 1883; Newton 1895). These cases are favourably reviewed by Keith (1928). Other anatomically modern human skeletal remains occur in the Early and Middle Pleistocene of Africa (Reck 1914; Zuckerman 1954:310; L. Leakey 1960; Patterson and Howells 1967; R. Leakey 1973; Senut 1981), the Early Middle Pleistocene of Java (Day and Molleson 1973), the Early Pleistocene of South America (Hrdlicka 1912:319–44), the Pliocene of South America (Hrdlicka 1912:346;

Boman 1921, 341–2), the Pliocene of England (Osborn 1921:567–9), the Pliocene of Italy (Issel 1868; Ragazzoni 1880), the Miocene of France and the Eocene of Switzerland (de Mortillet 1883:72) and even the Carboniferous of North America (*The Geologist* 1862). Several discoveries from Californian gold mines range from Pliocene to Eocene (Whitney 1880). Some of these bones have been subjected to chemical and radiometric tests that have yielded ages younger than suggested by their stratigraphical position. But when the lack of reliability and weaknesses of the testing procedures are measured against the very compelling stratigraphic observations of the discoverers, it is not at all clear that the original age attribution should be discarded (Cremo and Thompson 1993:753–94).

Human-like footprints have been found in the Carboniferous of North America (Burroughs 1938), the Jurassic of Central Asia (*Moscow News* 1983, 4:10), and the Pliocene of Africa (M. Leakey 1979). Shoe prints have been reported from the Cambrian (Meister 1968) and the Triassic (Ballou 1922).

In the course of negotiating a fashionable consensus that anatomically modern humans evolved from less advanced hominids in the Late Pleistocene, scientists gradually rendered unfashionable the considerable body of compelling contradictory evidence summarized above. It thus became unworthy of discussion in the circles of those in the know. Richard Thompson and I have concluded (1993) that the muting of this evidence was accomplished by application of a double standard, whereby favoured evidence was exempted from the severely sceptical scrutiny to which unfavoured evidence was subjected.

One example from the many that could be cited to demonstrate the operation of linear progressive preconceptions in the editing of the archaeological record is the case of the auriferous gravel finds in California. During the days of the California Gold Rush, starting in the 1850s, miners discovered many anatomically modern human bones and advanced stone implements in mine shafts sunk deeply into deposits of gold-bearing gravels capped by thick lava flows (Whitney 1880). The gravels beneath the lava were from 9 million to 55 million years old, according to modern geological reports (Slemmons 1966). These discoveries were reported to the world of science by J.D. Whitney, state geologist of California, in a monograph published by the Peabody Museum of Natural History at Harvard University. From the evidence he compiled, Whitney came to a non-progressivist view of human origins—the fossil evidence he reported indicated that the humans of the distant past were like those of the present.

To this W.H. Holmes (1899:424) of the Smithsonian Institution replied:

Perhaps if Professor Whitney had fully appreciated the story of human evolution as it is understood today, he would have hesitated to announce the conclusions formulated, notwithstanding the imposing array of testimony with which he was confronted.

This attitude is still prominent today. In their college textbook, Stein and Rowe assert that ‘scientific statements are never considered absolute’ (1993:41). But they also make this very absolute statement:

Some people have assumed that humans have always been the way they are today. Anthropologists are convinced that human beings... have changed over time in response to changing conditions. So one aim of the anthropologist is to find evidence for evolution and to generate theories about it.

Apparently, an anthropologist, by definition, can have no other view or purpose. Keep in mind, however, that this absolute commitment to a linear progressive model of human origins, ostensibly irreligious, may have deep roots in Judeo-Christian cosmology.

One of the things Holmes found especially hard to accept was the similarity of the purportedly very ancient stone implements to those of the modern Indians. He wondered (1899:451–2) how anyone could take seriously the idea that:

the implements of a Tertiary race should have been left in the bed of a Tertiary torrent to be brought out as good as new, after the lapse of vast periods of time, into the camp of a modern community using identical forms?

The similarity could be explained in several ways, but one possible explanation is the repeated appearance in the same geographical region of humans with particular cultural attributes in the course of cyclical time. The suggestion that such a thing could happen is bound to strike those who see humans as the recent result of a long and unique series of evolutionary changes in the hominid line as absurd—so absurd as to prevent them from considering any evidence as potentially supporting a cyclical interpretation of human history.

It is noteworthy, however, that a fairly open-minded modern archaeologist, when confronted with the evidence catalogued in my book, himself brought up, in a somewhat doubting manner, the possibility of a cyclical interpretation of human history to explain its occurrence. George F. Carter, noted for his controversial views on early man in North America, wrote to me on 26 January 1994:

If your table on page 391 were correct, then the minimum age for the artefacts at Table Mountain would be 9 million [years old]. Would you think then of a different creation—[one that] disappeared—and then a new start? Would it simply replicate the archaeology of California 9 million years later? Or the inverse. Would the Californians 9 million years later replicate the materials under Table Mountain?

That is exactly what I would propose—that in the course of cyclic time, humans with a culture resembling that of modern North American Indians did in fact appear in California millions of years ago, perhaps several times. ‘I find great difficulty with that line of reasoning,’ confessed Carter. But that difficulty, which encumbers the minds of most archaeologists and anthropologists, may be the result of a rarely recognized and even more rarely questioned commitment to a culturally acquired linear progressive time sense.

It would, therefore, be worthwhile to inspect the archaeological record through other time lenses, such as the Puranic lens. Many will take my proposal as a perfect example of what can happen when someone brings their subjective religious ideas into the objective study of nature. Jonathan Marks (1994) reacted in typical fashion in his review of *Forbidden Archaeology*: ‘Generally, attempts to reconcile the natural world to religious views end up compromising the natural world.’

But until modern anthropology conducts a conscious examination of the effects of its own covert, and arguably religiously derived, assumptions about time and progress, it should put aside its pretensions to universal objectivity and not be so quick to accuse others of bending facts to fit religious dogma. *Om Tat Sat*.

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## 4 German Romantic chronology and its impact on the interpretation of prehistory

FRANK JOLLES

‘Chronology’, according to *Myers Grose’s Konversations-Lexicon* (1889) ‘is the science of the subdivision and measurement of time by means of which order and clarity are introduced into the sequence of historical events’ (author’s translation: vol. 4, 100). It is, as we shall see, not only a prerequisite for the study of history but also crucial to the psychological orientation of the individual in the world and the cosmos. In the second half of the eighteenth century it figured as a distinct discipline on the syllabuses of German universities, and, along with geography, it was regarded as a complementary requirement (*Hilfswissenschaft*) for history.

It concerned itself with three main areas:

- (1) The establishment of a solar calendar including the study of calendars used by other cultures.
- (2) The correlation of ‘epochs’ (*Epochen*) such as the Greek Olympiads, the founding of Rome, the birth of Christ, from which to date historical events. This was achieved by using verifiable evidence like eclipses.
- (3) The harmonization of these and other records of the past as revealed by archaeology, epigraphy, numismatics, palaeontology, etc. with the testimony of the Bible.

Chronology in its function of dating past events has a venerable tradition stretching back into Greek antiquity, for instance in the marble tablet preserved in the Arundel Collection (Böckh 1843:2). But the chronology of the Christian era (with which we are concerned here) did not depend on classical sources, as was the case with so many of the sciences from astronomy to natural history. It was based on the Bible. Its main endeavour was to derive an authoritative dating for the creation of the world with respect to the birth of Christ. This was to be achieved by collating all the relevant references to be found in the testaments. However it proved impossible to achieve unanimity. The church historian Eusebios of Caesarea (c. AD 260–340) was probably the first to attempt this. In what has survived of his *Chronikon* (first published by J.J. Scaliger in the sixteenth century) he postulated the year 4000 BC for the creation of the world. In the fifth century an Egyptian monk Panodorus calculated a span of 5,493 years from



the creation to the birth of Christ. This was to form the basis of the Greek Orthodox calendar. In the seventeenth century the Jesuit priest Denis Pétau, also known as Petavius (1583–1652), reckoned 3,986 years (Petavius 1627, 1628, 1630). There were a number of others including the humanist Joseph Justus Scaliger (1540–1609), ‘the Hercules of Chronology’ (A.W.Schlegel 1821:90. XXIX, 27), mentioned above, the Irish Bishop James Usher (1581–1656) who estimated 5,000 years and Sir Isaac Newton (1643–1727). Most estimates came to about 4,000 years. The most recent one, adopted by the distinguished historian Johann Christoph Gatterer (1727–99) was 4,181 years (Gatterer 1785).

In all these estimates this period was subdivided into two parts: from the creation to the flood and from the flood to the birth of Christ. It was thought possible to derive a date for the flood by tracing the genealogies of the Patriarchs: it came to 1,656 years after the creation. Because the flood was considered a universal event, it was the great caesura in the prehistory of the world. On the one hand it marked the end of the mythological age. From a geological perspective it also marked the end of the period of upheavals (*Revolutionen*) that was thought to have characterized the early world. From a palaeontological point of view it was regarded as the time at which the marine fossils were formed, that were being discovered in ever greater numbers all over the dry land and even on mountain tops. Above all it was also the beginning of the re-population of the earth by the descendants of Noah which heralded the era of human civilization. The second part could then be further subdivided into the period before and after the fall of Troy. Though the actual date of the fall of Troy was disputed, there was no doubt that it had taken place. Moreover, it was the point of departure of the Attic chronology in the Marble Tablet of Arundel mentioned above, which contains a chronology of Greek history from 1582 to 264 BC, and so could be regarded as the epoch from which history proper commenced. The realm of prehistory could then be assigned to the period between the flood and the fall of Troy.

During the Enlightenment in the eighteenth century doubts began to be voiced about the time scale. The examination of different layers of sedimentary rocks suggested that the fossils were formed over long periods of time—far greater than the duration of the flood—and that their forms had evolved gradually (Buffon [no date]: vol. 1, 133ff.). This view was inherent in the work of Buffon (1707–88), whose immensely influential *Natural History* (1749–88) was one of the source books for the early Romantics. It was Buffon, also, who convincingly effected the separation of natural history from theology. The evidence of gradual evolution deduced from the fossil record was countered by contending that the six days of the biblical creation were not to be taken literally, and that the earth may well have existed for a long time before it became habitable for the human race. J.G.Herder, of whom more later, agrees with this, although he regards the periods Buffon allots to his first four epochs: 26,000, 35,000, 15,000–20,000 and 10,000 years respectively as inconceivably long: ‘Human reason, feeling its limitations, laughs at these imaginary figures’, even if he were to regard the division into epochs as correct (Herder [no date]: vol. 4, 172). Another objection maintained that the 4,000 odd years since the flood were

insufficient to re-populate the world to its present degree from a single pair of progenitors. In our own time we are, of course, familiar with population growth projections; Friedrich Schlegel worked out that ‘4000 years before Christ, of which 2000 years have to be deducted for the period before the flood, is definitely too little; 6000 years before Christ may be entirely sufficient to explain everything’ (F.Schlegel 1960:14, 12). Yet a further objection drew attention to the chronologies of other cultures, particularly the Indian and the Chinese, which attributed a far greater age to their civilizations and hence to mankind. This last objection was countered by suggesting that for the early period of these chronologies years should be read as days, later as months and so on. Using this method the French astronomer Jean Sylvain Bailly (1736–93) managed to reduce the Indian *annus mundi*, that is the beginning of the age of Kali (A.W.Schlegel 1821:90. X) from 4,320,000 years to 3101 BC bringing it into line with the Christian tradition. Bailly was also known for his theory that most of the scientific discoveries of the world had their origin in an ancient civilization that was subsequently destroyed (Bailly 1777)—a point to which I shall return presently.

By the turn of the century, in 1802 to be precise, August Wilhelm Schlegel (1767–1845), the foremost proponent of the Romantic movement, concluded in his famous Berlin lectures that:

At the end of the day one will have to admit that one is wasting one’s wit on an endless study, and that one will not wish to add to the numerous folios of existing chronologies. The best rule will be to withdraw into the area of historical certainty, and to content oneself with approximations measured in generations or centuries where prehistoric times are concerned. The very earliest limit will not reach back far beyond the first Olympiads, as the destruction of Troy, though the fact in itself can not be doubted, already belongs entirely to a mythical age....

(A.W.Schlegel 1802–4:90. XXVII, vol. 1, 208)

A few pages further on he concedes that the earth may well have been in existence for a long time before it became suited to human habitation, but believes that ‘the time that our chronology assigns to the beginnings of the human race’ must have come soon afterwards (90. XXVII, vol. 1, 211).

Throughout the eighteenth century there had been a gradual emancipation from the biblical interpretation of prehistory. For all its revolutionary fervour in the field of literature and art the early Romantic movement (as represented here by August Wilhelm Schlegel and his brother Friedrich) had done little more than continue along the path that had been trodden by its predecessors. The break with the old tradition came in the ensuing decade: the decade of the Napoleonic wars, which (even more than the French Revolution) marked the end of the old order in European science and scholarship. At its most fundamental level the difference between the old order and the new lay in a shift from the synthetic universalist

outlook of scholars who were for the most part people of leisure, to the particularist viewpoint of professionals who were salaried specialists in their respective fields. There is no doubt that the early Romantics had universalist aspirations. That was reflected, for instance, in A.W.Schlegel's strategy of holding six overlapping series of lectures: three courses on art and literature 1801–3 (A.W. Schlegel 1884), and three courses on the 'Encyclopaedia of the Sciences' 1802–4. At that time he was living more or less precariously by his pen. When he accepted the post of Professor at the newly founded University of Bonn in 1818 he became a Prussian civil servant with an assured income. He still lectured on a remarkably wide range of subjects to fulfil his teaching obligations. But although the array of topics as a whole reflected a universalist encyclopaedic programme, in practice the individual courses became more and more self-contained and specialized. Moreover, the students were not obliged to take any particular combination of courses; they could pick and choose as they liked. As time went on Schlegel channelled more and more of his energies into an arcane specialism that would never have supported him as freelance writer: namely, the introduction of Sanskrit and Indian studies into Germany, and the editing, setting and printing of the major Sanskrit classics on a printing press in Bonn for which he had personally supervised the casting of the Devanagari movable type with the help of a grant from the King of Prussia. In effect, the grand vision of an interrelated totality of disciplines functioning like the parts of a living organism that had inspired the 'Encyclopaedia of the Sciences' no longer applied. Chronology and the other *Hilfswissenschaften*, which had previously been integrated into the scheme of things were consequently demoted to their separate functions.

The subject of chronology is raised very briefly in a course of introductory lectures entitled 'On Academic Studies' which Schlegel first delivered in 1819, but really only to stress that though it has 'simple fundamentals', it remains an 'extremely hypothetical science' (1971:59). Finally, in his 'Lectures on the History of the Ancient World', first held in the summer semester of 1821, Schlegel places the study of chronology into an historical context. He treats its theory and history but says little about its application. This is mainly because he has decided to limit the scope of history proper to the period from which a continuous record of events is available, namely from about 500 BC, as chronology is not a problem here. The earlier period remains hypothetical: 'Comparison of the history of the entire human race to a many-armed river of which one does not know the source or the mouth' (A.W.Schlegel 90. XXIX).

The linkage between theology and history was doubtless a natural one for an age that still largely lived by religious precepts. However, a divine act of creation necessarily implied a moral purpose and raised expectations of a visible hand of God in the historical process. As a result, prehistory, which, almost by definition, could not be supported by any direct evidence, was relegated to a place of secondary importance as it could never serve as an illustration of such a purpose. On the other hand, any speculations about the nature of man and society in prehistoric times were bound to become interpretations (or models) of the divine purpose itself. This included inferences about the past based on the present such as the controversy about the origin of mankind in a single act of creation or several.

The presence of different races and languages on the earth suggested the latter. Then again, there was disagreement about how much knowledge, language acquisition, social organization, technological skills, etc. mankind was endowed with at the time of creation. If we consult popular sources of the previous century, for example the illustrations by Merian in Gottfried's *Chronica* of 1642, we find that immediately after the expulsion from paradise Adam was ploughing with a pair of oxen, harvesting vegetables such as cabbages, turnips and carrots from a carefully fenced garden, while Eve was sitting on the verandah of a thatched house in front of a cooking pot over a fire, there is a cock on the roof, a store house with an artful ventilation system in the distance, and so on (Gottfridi 1642:14). So in the popular imagination at least Adam and Eve and their descendants lived in a primordial condition of self-sufficiency and—presumably—contentment based on the technology of an agricultural economy. The idea of a gradual evolution from a savage condition was not yet applied to them—it was not widely held anyway—while a connection between humans and animals was rejected until well into the nineteenth century. Thus Friedrich Schlegel around 1805 pointedly disowns the suggestion that the 'Ethiopians', by which he means black Africans, are 'an intermediary species between apes and humans.... It is mistaken to regard them as an intermediary species between apes and humans. It is also incorrect from a physical point of view. The human being is either human being or animal' (1960: vol. 14, 13). In the absence of evolution many commentators agreed that the further one receded in time, the closer one approached a form of society governed by divine precepts. It seemed to follow that all subsequent conditions represented various degrees of decline.

In Germany the discussion on the origins of human society reached a sort of climax towards the end of the century in the dispute between Kant and Herder. From the point of view of the Enlightenment the central problem was how to justify such destructive passions as envy, greed, aggression and lust for power in the overall scheme of things. Kant tried to demonstrate that these anti-social qualities were necessary for the advancement and ultimate perfection of society. In his essay on 'The Idea of a Universal History from a Cosmopolitan Perspective' of 1784 (1867: vol. 4, 141–59; Kant 1914:22–34), he develops his argument from the a priori proposition 'that nature has implanted certain capacities in human beings in order that they may be developed to their full potential', and its corollary 'that human history exhibits the mechanisms by which Nature ensures the development of these capacities'. The following propositions (much abbreviated) contain the essence of his argument with respect to prehistory:

Fourth Proposition:

The means which nature employs to bring about the development of all the capacities implanted in men is their mutual antagonism in society....

Without those qualities of an unsocial kind out of which this antagonism arises...men might have led an Arcadian shepherd life in complete harmony, contentment and mutual love, but in that case all their talents would forever have remained dormant. As gentle as the sheep they tended, such men would hardly have won for their existence a higher worth than belonged to their domesticated cattle; they would not have filled up with their rational nature the void remaining in the creation, in respect of its final end.... Hence they [the natural antagonistic impulses] clearly manifest the disposition of a wise Creator, and not the hand of a malicious spirit that has meddled with His glorious creation, or spoiled it from envy.

**Eighth Proposition:**

The history of the human race viewed as a whole, may be regarded as the realisation of a hidden plan of nature to bring about a political constitution, internally, and, for this purpose, also externally perfect as the only state in which all the capacities implanted by her in mankind can be fully developed.

So, according to Kant, antagonisms fuelled by all those qualities of greed and aggression are part of nature's purpose for the development of society. It follows that a prehistory represented by an 'Arcadian shepherd life in complete harmony' is of no intrinsic interest, because it does not form a part of nature's purpose and can tell us nothing about human nature. The same applies to a prehistory governed by unredeemed 'mutual antagonism' as that would merely result in a 'lawless state of savages'. Only the documented struggle of the human spirit can reveal the hidden purpose of nature, or, more pointedly, as Kant put it quoting Hume in a footnote to the 'Ninth Proposition': 'The first page of Thucydides is the beginning of all true history.'

Herder's approach is in many respects the opposite of Kant's. Instead of deriving a theory from an a priori proposition, he tried to assemble the totality of the knowledge of his time to present the most plausible scenario for the course of history. The shortcoming of this approach, as Herder is the first to admit, lies in the fact that the information available to him was based on 'foreign, incomplete and at times dubious reports' (Herder [no date]: 4, 69). So although his method is inductive, it is also speculative in that he is forced to make a number of a priori assumptions. His ideas are contained in two separate publications. A shorter work entitled: *Another Philosophy of History Dealing with the Development of Mankind*, with the subtitle *A Further Contribution to the Many Contributions of this Century* was published in 1774. The second is the major work of his later years: *Thoughts on the Philosophy of the History of Mankind*, 1784–91 (Herder, no date: vols 3–6), the first part of which appeared in the same year as Kant's *Idea of a Universal History*.

Herder also supports the idea that mankind is descended from a single pair of parents. The disparities between the inhabitants of different parts of the

world can be attributed to the influence of the environment, particularly the climate. This applies not only to man but also to plants and animals. He devotes considerable space to demonstrating this thesis. Although at times his arguments seem to lead him to the very brink of the principle of natural selection he shies away from it, maintaining the complete integrity and immutability of the species (Herder, no date: vol. 3, 103, 134f., vol. 4, 60ff.). (Recognition of the principle of selection was to become unavoidable once Thomas Robert Malthus had published his *Essay on the Principles of Population* in 1798.) Studies in comparative anatomy led Herder to the conclusion that man's upright posture has given him unique advantages over the apes particularly where shape of the skull and hence the development of the brain are concerned (vol. 3, 131–5). This, and all that flows from it, forms the main distinction between man and the animals:

So look up to the heavens, o man, and rejoice with trembling at your immeasurable advantage that the Creator of the world has linked to such a simple principle: your erect stature. If you were to go bowed down like a animal, then your head would be formed according to the same voracious position of mouth and nose and your entire frame would conform to that. Where then would your higher spiritual powers be, the image of the divinity that is invisibly implanted in you?  
(vol. 3, 147)

Herder observes that the adaptations that result from exposure to different climates are passed on genetically, though he believes that they can also be reversed easily. As an instance he cites that Negroes retain their features when transplanted to Europe, but when they marry Europeans their offspring no longer retain any Negro features. In fact he regards extreme mutability as a distinctive feature of the human species, and argues that on account of this humans can regress and degenerate in a way that animals cannot—though they can never completely lose the characteristics of their human species. As examples he cites the 'eleven or twelve instances' in which humans have been found living among animals. This (very briefly) is the biological and ecological basis of his ethnology.

A detailed examination of the physical geography of the globe leads Herder to the conclusion that the original creation must have taken place somewhere in a valley on the southern flank of the great Eurasian mountain chain that runs from Turkey through Iran, Afghanistan and Tibet into China. This mountain chain he regards as the primeval land mass of the western hemisphere which expanded southwards as the seas receded. From this valley people gradually migrated into the newly formed lands, adapting to the conditions they encountered as they went: first southwards into India, then across to Europe, down to the Pacific Islands, into Africa, eastwards through Asia and across the Bering Straits into the Americas. Later (1804) Friedrich Schlegel was to claim that the whole of Egypt and China are of Indian origin and the Indian influence may be found as far afield as Kamchatka and 'the South Sea islands up to Otaheiti' (F.Schlegel 1960: vol. 14, 38). But Herder

is still rather vague about such details. He speculates that ‘a garden was the first abode of man’ because ‘garden life was the easiest for the newly born mankind.... Every other form of life, in particular agriculture demands experience and expertise.’ He believes that the ‘garden life’ is in tune with the basic nature of man, who is created ‘not for wildness, but to lead a gentle peaceful life’. Any subsequent ‘running wild’ is a degeneration brought about by adverse circumstances. As time progressed man acquired knowledge and skills by observing the animals. Subsequently Herder envisages a long period of time—perhaps 2,000 years—during which there was a nomadic patriarchal society based on herding. This was followed by the sedentary agricultural way of life which first developed in Egypt (Herder, no date: vol. 4, 173f., also 1967, 7–18).

Herder’s profound interest in prehistory is grounded in the fact that he too postulated a divine purpose in the interaction of mankind with his natural environment. In Herder’s view the goal of man’s journey was the realization of the ideal of ‘humanity’: *Humanität*. While the course of history showed an overall progression (with the occasional local regressions), the ideal could manifest itself at any stage. In line with the new spirit of historicism with which he is credited, Herder avoids comparative value judgements; instead he likens the different stages to a process of maturation in which the nomadic phase is seen as childhood, the agricultural as boyhood, and so on. By means of his inductive method—heaping demonstration upon demonstration from a vast fund of learning in an infectious enthusiastic style—he effectually rehabilitates what had been regarded by many as a dark and savage age.

Kant and Herder have in common that they both infer a purpose to human history, which places any subsequent epochs onto a higher level than the previous ones. In his review of Herder’s *Thoughts on the Philosophy of the History of Mankind* (1785) Kant interprets this as a moral prerogative:

the purpose of mankind as a whole is constant progress, and its perfection is nothing but a mere yet most useful concept of the destination towards which we should direct all our efforts in accordance with the intention of providence.

(Kant 1867–8: vol. 4, 191)

It is here that Kant sees a contradiction in Herder’s assumption that the ideal of humanity could be realized at any stage. He writes:

Does the author wish to imply that, if the happy inhabitants of Otaheiti, never visited by civilized (*gesittet*) nations, were destined to live for thousands of centuries in their peaceful indolence, that one would then be able to give a legitimate answer to the question why they existed at all, and whether it would not have been just as good for these islands to have been occupied by happy sheep and cattle as by people happy in the mere pursuit of pleasure?

(Kant 1867–8: vol. 4, 190)

This clearly has far-reaching implications for the study of prehistory: in the end Herder's view was to prevail and prehistory and ethnology were to be studied as testimonies of the origins of mankind. But for the time being attention was focused on the concept of 'universal history' (*Universalhistorie*) as the key to understanding the workings of providence.

What was *Universalhistorie*? The following is August Wilhelm Schlegel's definition in 1803:

So much is clear: our Universal History makes no claim to be a history of the whole of mankind.... Particular countries and the peoples that inhabit them emerge from the darkness one after another, they help to enact the great drama which the thread of the story follows as it unfolds. Their separate history (*Specialgeschichte*) can indeed sometimes be traced back to a considerably earlier period, but it is unrelated to the rest.

(A.W.Schlegel 1802–4:90. XXVII, vol. 1, 356f.)

Universal history, he seems to be saying, is rather like a relay race in which the torch of progress is handed down from nation to nation. Each one emerges from obscurity only to drop back into darkness after it has made its contribution. Herder had already suggested such a succession of 'torch bearers'. Schlegel's thread of universal history leads from India through Babylon, Egypt, the Phoenicians, Greeks, Etruscans and Carthagenians to Rome and thence to the Middle Ages and the modern states of Europe. But prehistory lies entirely beyond its range. It is also beyond the reach of a moral interpretation—and that is the important change.

Before the turn of the century prehistory had been largely a matter for speculation. There were no proofs. So it is not surprising that it received a new impetus when Friedrich Schlegel demonstrated how linguistic analysis, in particular comparative grammar, could be used as a tool for objective (rather than speculative) historical research. It came as a revelation, and was presented with appropriate flair and *gravitas* in his treatise *On the Language and Wisdom of the Indians* (1808). The following is taken from the introduction to the third volume:

The ancient languages, of which we have tried to trace the family tree from the roots to the main branches in the first book, are a document of history more ruined and gigantic in size than those the latter-day world has gazed on with amazement in Persepolis, Illoure or the Egyptian Thebes.

(F.Schlegel 1975: vol. 8, 257)

Further grist to the comparatists' mill was added by the wealth of detailed scientific, ethnological and linguistic information that was brought home by the great voyages of discovery: Captain Cook (1769–9), Alexander von Humboldt (1799–1803), Adam Johann von Krusenstern (1803–6) are just a few that spring



to mind. The effect was to transform the direction of universal history. Thus in his *Introduction to the General History of the World* (1821) August Wilhelm Schlegel now demands:

a cosmopolitan spirit in the presentation. What does that mean? Transcending national limitations. Not to judge what is distant in time and space according to its similarity or dissimilarity with our social conditions. An *intellectual interest* in learning about humanity in all its different phases, to explore the spirit and soul beneath all the different external manifestations. The physiognomy of the nations. *Philanthropic interest.*

(90. XXVII, 12f)

In the *History of the Ancient World* (1821) his point of departure is the present condition of the world with its multiplicity of cultures, constitutions, religions, customs and technologies. He envisages a *comparative anthropology* or *historical anthropology* supported by *comparative linguistics* (90. XXIX, 45). But he warns about the dangers of drawing conclusions about the past from the present, 'the greatest care must be exercised', he says, 'deeper historical research must recognize the great distance between the ages' (90. XXIX, 20). Finally, the theological connection is ruled out of court:

It is inadmissible for history to meddle with theology, as has often been the case, when people have passed off the figments of their imagination and their errors as plans of divine providence, or have based mundane prophecies on misconceived facts. On the other hand intervention by the theological fraternity into the freedom of scholarly research cannot be tolerated.

(90. XXIX, 15ff)

All this points to the sort of scholarly research based on meticulous evaluation of evidence that was to characterize Schlegel's own endeavours in the latter half of his life.

## SUMMARY AND CONCLUSION

In the eighteenth century chronology was an independent subject within the historical sciences. It maintained this position not only in its own right, but also because it was the key discipline linking the secular tradition derived from classical antiquity, to the Judeo-Christian tradition contained in the testimony of the Bible. Its main function was seen as harmonizing these two traditions in order to demonstrate the primacy of divine providence. With the emergence of new scientific evidence that cast doubt on the validity of the biblical record, particularly on the date of the creation, the original role of chronology became ever more difficult to maintain. It became increasingly evident that revision was unavoidable. Initially it proved difficult to adjust to substantially increased timescales. Buffon's

estimate of around 100,000 years appeared quite beyond the bounds of reason even to Herder. In Germany, the turning point in the philosophical debate was reached with the publication of Herder's *Ideen*, which proposed an evolutionary model for the development of human society, and with the subsequent criticism of that model on moral grounds by Kant. The effect was to disassociate chronology from religion. This ushered in an era of historical and anthropological inquiry free from dogmatic influence and gave a new lease of life to the discipline of *Universalhistorie*. It also changed perceptions of the link between mankind and the act of divine creation of the world, by relegating the latter from a more or less fixed date that could be reckoned in generations, to a speculative past beyond the realm of any experience. The central position hitherto attributed to mankind in the scheme of things, insofar as it was dependent on the time frame and the moral prerogative inherent in the story of the creation, had to be abandoned.

This brought about a reassessment of prehistory as an independent discipline based on an anthropological approach. As the biblical framework lost its validity, ever increasing vistas into a remote past were opened up. The new spirit of inquiry became an end in itself, a source of satisfaction and wonderment that, strangely enough, transcended the agonies of religious doubt, or at least bypassed them. Casting aside the polemics of the old century, it set its sights on more modest but realizable objectives. This is August Wilhelm Schlegel expounding the sober yet exhilarating doctrine of scholarly research to his students in his introductory lectures *U'ber das academische Studium* in 1819, a year after his appointment to the newly established University of Bonn:

Altruistic love for what is true and good [is] analogous to morality. Arduous initially—Hesiod's maxim. [The Gods demand sweat, before we aspire to virtue.]—Devotion to scholarly work a source of support for the whole of life. An independent pleasure—upliftment, diversion, relaxation, a solace in every predicament.

(1971:47)

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## 5 *Keeping industrial time*

JOHN RULE

Alan Sillitoe's highly regarded novel of 1958, *Saturday Night and Sunday Morning*, is structured around the daily and weekly work and leisure rhythms of Nottingham, one of England's leading manufacturing towns. To the novel's readers these would have seemed normal and everyday:

He had often heard Friday described as Black Friday...and wondered why this should be. For Friday, being payday, was a good day, 'black' would be more fitting if applied to Monday. Black Monday...because the big grind was starting all over again.

(Sillitoe 1960:17–18)

The novel's working-class hero, Arthur Seaton, may have been missing the point about 'Black Friday'. It was so considered from the point of view of the firm and of the customer, for it was considered that slipshod work was characteristic of the last shifts before the weekend holiday. He was, however, clear enough about the patterning of his week. On Saturday night you drank away the tedium of the preceding five days; 'the effect of a week's monotonous graft in the factory was swilled out of your system' (1960:5). But on Monday morning it was back to work again:

They were caught by the main ingoing stream: bicycles, buses, motorbikes and pedestrians on a last minute rush to breach one of the seven gates before half-past.

(1960:22; see Rule 1994:1–9)

Mid-twentieth-century readers would hardly have paused at such passages. Had not the working and non-working time of the urban/industrial working class always been so structured? Was it not in the nature of their work to be regular?

Monday seems the place to begin. In 1864 the great Italian liberator and patriot Garibaldi visited England. He enjoyed an enormous popularity. When he entered London the streets were lined by cheering thousands. It was a Monday and it was commented that that weekday was when 'the working men were most at liberty' and that 'St Monday was kept as it was never kept before' (Finn

1993:220). By that time ‘Saint Monday’ was nearing the end of its long history. In the eighteenth century its observation had been commonplace. Contrast the Monday to Friday rhythm of mid-twentieth-century Nottingham, with that of late eighteenth-century Sheffield as described in the ballad *The Jovial Cutler*. Then, indeed through the nineteenth century and into the twentieth, the cutlery manufacture was organized in a multiplicity of small forges, and the working cutlers, although dependent on merchant-capitalists, who bought their knives at piece-rates and who tied them into a credit system for the iron on which they worked, were still largely in control of their own work-rhythms. The song begins with a cutler sitting in front of his fire on a Monday morning:

Brother workmen cease your labour,  
 Lay your files and hammers by.  
 Listen while a brother neighbour  
 Sings a cutler’s destiny  
 How upon a good Saint Monday.  
 Sitting by the Smithy fire  
 Telling what’s been done o’ t’ Sunday  
 And in cheerful mirth conspire.

(Lloyd 1913:181)

So much for Monday, but what of the rest of the week? When his wife berates him for his laziness, he describes her nagging tongue as ‘moving faster than my boring stick at a Friday’s pace’. Here, then we have what historians have come to recognize as the classic rhythm of the home-based outworker: Monday a holiday, Tuesday rather slack, while Friday demanded a furious pace to complete the number of items needed to make wages. Weavers working by the piece on cottage looms worked similarly. Indeed it is hardly surprising that a man could control his own pace when working in a cottage (unless rates fell to a point when only constant work through the week made living wages), but the pattern was also characteristic of small workshops where men paid by the piece came and went with an irregularity which did not pose too many problems for employers who had only small investment in fixed capital. Garibaldi could have received as enthusiastic a welcome had he arrived on a Monday at Sheffield, or, for that matter, Birmingham, where the hardware manufacture was similarly based on small firms and workshops and where it has been shown ‘Saint Monday’ was widely observed down to the 1860s. It was also kept down into the second half of the century in the workshops of London according to a ‘Journeyman Engineer’ in 1867 (Wright 1867:108–30; Reid 1976). Even in the potteries of Staffordshire, where in the eighteenth century Josiah Wedgwood had pushed the division of labour to its extreme and boasted that he ‘had made such machines of men as cannot err’ (although he acknowledged that he could not stop his workmen going absent for the local Wakes) (McKendrick 1961:46), in less regulated pottery works, Saint Monday still persisted into the mid-nineteenth century. An ‘Old Potter’ recalled that child and female assistants came into the works on Mondays and Tuesdays to prepare clay for adult male potters

who were mostly absent drinking. Largely unsupervised, the helpers themselves worked in a more relaxed way and left early. However, when the potters returned in earnest on the Wednesday, they began to demand 14 or even 16 hours' labour from their assistants as they desperately sought to make up their wages.

The old potter, a Methodist, had different ideas of proper time-economy, and regretted:

How impossible economy was in a trade so loosely conducted. It would have been better for employers and workpeople if they had been in the disciplinary grip of machinery.

(Shaw 1903:49–54, 185)

This brings us to the historical significance of the early nineteenth-century factory system with its powered machinery. Its link with work-time and with the pace of labour was not missed by contemporaries.

While the engine runs the people must work—men women and children are yoked together with iron and steam. The animal machine, breakable in the best case...is chained fast to the iron machine which knows no suffering.

(cited in Rule 1986:136)

So much for pace, but what of regularity? A mid-nineteenth-century employer in Sheffield lamented that grinders kept no stated hours of labour and remarked:

the factory hand is necessarily in a condition of dependence on the Manufacturer...this authority on the one side and subjection on the other...scarcely exists in Sheffield. The relation of Employer and employed there has very little in it of the relation between master and servant.

(cited in Rule 1986:134–5)

In *Hard Times*, published in 1854, Dickens wrote of the mill-workers of Coketown that they 'all went in and out at the same hours, with the same sound on the same pavements to the same work', the intensity of which was determined by the piston of the steam engine working up and down 'like the head of an elephant in a state of melancholy madness' (cited in Rule 1986:134–6).

The association of the basic time-economy of modern industry with the coming of the factory was the subject of a classic article by the late E.P. Thompson. 'Time, work-discipline and industrial capitalism' was published in 1967 and rapidly attained the status of orthodoxy. With characteristic verve, insight and grasp, that great historian moved across cultures and through centuries in pursuit of his thesis that the transition to industrial society entailed 'a severe restructuring of working habits—new disciplines, new incentives, and a new human nature' (1967:57). There had, to be, Thompson insisted, 'changes in the inward notation of time' (1967:61):

The natural rhythms of pre-industrial rural and urban life based on task time were replaced by stricter codes related to production governed by the clock. In the latter this measurement came to embody a simple relationship... Those who are employed experience a distinction between their employer's time and their 'own' time. A distinction which amounts to the demarcation between 'work' and 'life' characteristic of industrial societies.

(1967:71)

What is offered in a very general sense is a three-stage model of the history of work-time:

The first generation of factory workers were taught by their masters the importance of time; the second generation formed their short-time committees in the ten hour movement; the third generation struck for overtime and time-and-a-half. They had accepted the categories of their employers and learned to fight back with them. They had learned their lesson, that time is money, only too well.

(1967:86)

As an outline history that retains considerable merit and indeed much thrust. The strength of Thompson's essay resides particularly in its analysis of the imperatives of early industrial capitalism. He wrote of employers' need to overcome the 'characteristic irregularity of labour patterns before the coming of large-scale machine-powered industry'. This pattern was one of 'alternate bouts of intense labour and of idleness wherever men were in control of their own working lives' (Thompson 1967:73). That they were so able and could make their own division of the day between work and non-work was, as has been noted, common both to cottage workers and to piece-paid artisans in small workshops where hand production methods still persisted. In Birmingham, for example, the 'matrix of small workshops' formed a 'conducive environment for the survival of immemorial work rhythms'. The working day of the eighteenth-century metalworkers was remembered in this way by a mid-nineteenth-century historian:

they lived like the inhabitants of Spain, or after the manner of the Orientals. Three or four o'clock in the morning found them at work. At noon they rested; many enjoying their siesta; others spent their time in the workshops eating and drinking, these places being often turned into taprooms and the apprentices into pot boys; others again enjoyed themselves at marbles or in the skittle alley. Three or four hours were thus devoted to 'play'; and then came work again till eight or nine, and sometimes ten the whole year through.

(Reid 1976:77)

These patterns were, as we have seen, described in many other manufacturing centres, such as Sheffield, the Potteries and the London print shops. But it was not

just the work and play rhythm of the day which employers came increasingly to confront, there was also that of the working week. Here the most evident problem was indeed ‘St Monday’, the proverbial symbol of the older pattern, and, where the factory system did not reach, it was still kept into the second half of the nineteenth century. There was also the even longer rhythm of the working year, and here modernizing employers confronted the holidays associated with traditional feasts, fairs and wakes, which periodically disrupted business for days at a time. ‘Common custom’, wrote John Clayton in 1755, ‘has established so many Holy-days, that few of our manufacturing work-folks are closely and regularly employed above two-third parts of their time’ (cited in Rule 1995:695).

While Thompson and others have described the conflict over work-time in the early Industrial Revolution, it is still hard to get a full sense of the process. If we listen to the voices of employers in isolation, we are often listening to exasperated lamentations of failure: from Josiah Wedgwood, for example, in the midst of his largely successful attempt to re-order the labour process in the pottery manufacture, he complained bitterly of his potters, that they had:

been at play four days this week, it being Burslem Wakes. I have rough’d and smoothed them over and promised them a long Christmas, but I know it is all in vain, for Wakes must be observed though the World was to end with them.

(Cunningham 1980:45)

One way to get a sense of process is to examine the changing pattern of work and leisure within a particular industry. Metal mining in Cornwall, for tin and, in the eighteenth and nineteenth centuries, for copper as well, was a long-established activity, but from the later eighteenth century several forces were working towards a greater management emphasis on constant and regular labour. Deep mining demanded heavy and risky investment, and the ‘interests of capital’ rapidly became paramount. Pumping by steam engines was essential, so fixed running costs were high, while the lowering and raising of larger numbers of miners from their underground workplaces put increasing emphasis on starting and finishing times.

Writing in the early eighteenth century, a local historian contested the view that the miners’ toil was extreme:

for what between their numerous holidays, holiday eves, feasts, account days...or one way or another they invent to loiter away their time, they do not work one half of their month for the owners and employers.

(cited in Rule 1995:696)

In 1758 another local writer mentioned a number of holidays peculiar to themselves observed by the miners in addition to those associated with New Year, Christmas, Easter and Whitsuntide and in addition each mining parish had its feast day which usually betrayed its name by lasting for the better part of a week. Before



the later eighteenth century these holiday practices were not the object of widespread condemnation. They were even subsidized with drink-money at some mines. Time, however, became more expensive as mining became deeper and more costly. At the beginning of the nineteenth century, a mine steward was complaining that 'pay days, taking days, and those so-called holidays' were still persisting and could cost the larger mines £100 a day in lost production. But by this time the erosion of customary work patterns had already begun. In 1817 it was claimed:

Desperate wrestling matches, inhuman cockfights, pitched battles, and riotous revellings are happily now of much rarer occurrence than heretofore; the spirit of sport has evaporated, and that of industry has supplied its place. The occupations in the mining districts fill up the time of those engaged in them too effectively to allow leisure for prolonged revels or frequent festivities.

(cited in Rule 1995:697)

A few years after that it was remarked that not only had traditional miners' holidays virtually ceased, but younger miners knew little about them. Only with the publication in 1842 of an official inquiry into working conditions does a representative picture across the industry become available. This strikingly reveals a substantial transformation of the eighteenth-century pattern. In general only Christmas Day and Good Friday were by then allowed as holidays. Evidence from individual mines gives an indication of the erosion process. In some areas the parish feast, but only the actual day, was still allowed and at one very large mine only a half-day was allowed. That same enterprise also allowed leaving work two hours early on Midsummer's Eve.

So far as closer regulation of the working day was concerned, a major development was the insistence that shifts relieved each other in place instead of at the surface, making for eight hours actual labour. According to a writer in 1778, in the early eighteenth century miners had often worked twelve hours underground, but with less intensity. They had made it a rule during their shift, 'to sleep out a candle, then rise up and work for two or three hours pretty briskly, then to have a smoke for perhaps half an hour, and so carry on through the working day'. Significantly this writer saw the ending of these long shifts after mid-century as a step towards improving labour productivity: 'mining now being more deep and expensive than it formerly was, those idle customs are superseded by more labour and industry'.

Cornish miners too, had kept their version of St Monday; locally it was known as 'Mazed (i.e. Mad) Monday'. Mine managers giving evidence in 1842 insisted that at the larger enterprises at least, those who failed to attend on Mondays were dismissed:

The men were in the habit of spending the Monday following their pay day and sometimes a day or two besides, in drunken rioting.... He told them that if they did not keep to their work, he should send

them about their business, and get those who would. This kept them pretty steady; but a short time since on his being called to some distance, they took advantage of his absence and returned to their old practices...he fined them a guinea a man [about a week's wages]. These measures seem nearly to have put a stop to the custom.

(cited in Rule 1995:697)

It has been suggested, however, on the basis of a detailed study of Bristol, a city not much affected by the factory system, that Thompson and others have exaggerated the importance of the factory and of large-scale mining operations in the modernization of work-time. Dr Harrison has argued from the fact that more than a third of all public events between 1791 and 1850 noted in the Bristol press took place on Mondays, that a regular working week, which owed nothing to the special economy of the factory was already in place by the mid-eighteenth century:

It is safe to stress that between 1750 and 1850, almost all employed people, especially in towns, were to be found at work between the hours of 6 a.m. and 6 p.m., Tuesdays to Saturdays.

(Harrison 1989:107-8)

Monday, he considers is best counted a fixed non-work day.

This is to go too far in its implication that Monday was a regular and agreed holiday. Widespread as was its observance by the artisan population, 'St Monday' was never uncontested. It was contested in fact not only by employers. It was to some extent by wives, certainly by the wife of the Jovial Cutler:

See thee what a pair of shoes  
 Gown and petticoat half-rotten  
 Soon I hear the trap door rise up  
 On the ladder stands my wife:  
 Damn thee Jack, I'll dust they eyes up  
 Thou leads a plaguy drunken life;  
 Here thou sits instead of working  
 With they pitcher on thy knee  
 Curse thee, thou'd be always lurking  
 And I may slave myself for thee.  
 See thee what stays I've gotten  
 N'er a whole stich in my hose  
 Thou knows I hate to broil and quarrel  
 But I've neither soap nor tea  
 Odd burn thee Jack, forsake they barrel  
 Or never more thou'st lie with me.

(Lloyd 1913:181)

St Monday was also contested by those responsible for order, for it was traditionally a day of disorder and there is some evidence too that it was resented

by unskilled workers who were forced, despite their greater need for earnings to take it along with the tradesmen with whom they worked.

The work on Bristol in fact rather confirms the significance of the factory in the history of work-time. For if St Monday even approached generality, then the factory masters' determined insistence on six-day working becomes more novel. The Bristol evidence too confirms at a local level the generalization of social historians that the 'normal' working day before and outside of the factory was ten hours: from 6 a.m. to 6 p.m. with two hours for meals. Since the new factories expected twelve or thirteen hours, then the short-time movement for factory reform as it grew over the early nineteenth century can be seen as an attempt to recover lost time, rather than as initially an attempt to advance the claims of labour. The point may be less that Garibaldi would have been equally welcomed in Sheffield, Birmingham or Bristol as he was in London, but whether he could have so been on a Monday in Oldham, Preston, Leeds or Manchester.

Factory-time was only one of the parallel time-cultures of working Britain in the early nineteenth century and the factory system still did not employ the majority of male manufacturing workers by 1850. But the factory was the most visible manifestation of industrial capitalism, indeed it was its symbol, and it increasingly set new norms, especially in its separation of work-time from non-work-time. And, further, only in the context of factory reform was there a truly *public* debate over the question of time and the working classes, and only in this context did time become manifestly a political matter.

Behind the arguments of Thompson and others lies an assumption that although it was to become 'internalized' to the point of being accepted as usual, the new time-economy of the factory era was less 'natural' than the irregular rhythms of pre-industrial times. Insofar as work had been task-defined or carried out within the 'natural' constraints of daylight or of season there is a clear point to this. In Wordsworth's great poem of 1814, *The Excursion*, The Wanderer coming across a water-powered factory in a rural setting views it as 'an outrage done to nature'. But as the poem proceeds it is clear that this outrage is not confined to 'nature' in a scenic sense. Night is approaching, but the 'soothing darkness' is affronted:

...an unnatural light  
 Prepared for never-resting Labour's eyes  
 Breaks from a many-windowed fabric huge  
 And at the appointed hour a bell is heard,  
 Of sharper import than the curfew-knoll  
 That spake the Norman Conqueror's stern behest—  
 A local summons to unceasing toil!  
 Disgorged are now the ministers of day;  
 And, as they issue from the illumined pile,  
 A fresh band meets them at the crowded door—  
 And in the courts—where the rumbling stream,  
 That turns the multitude of dizzy wheels,

Glares, like a troubled spirit, in its bed  
 Among the rocks below. Men, maidens, youths,  
 Mother and little children, boys and girls,  
 Enter, and each the wonted task resumes  
 Within this temple, where is offered up  
 To Gain, the master idol of the realm  
 Perpetual sacrifice.

(Wordsworth 1814)

Consider the double meaning here through which the regime of the factory is indicted as unnatural. The artificial light enables ‘unresting labour’ not only from men, but more significantly from women and children in a workplace separated from the home. It was this aspect of the factory economy which led Richard Oastler, the factory reform movement’s leading orator, to pronounce the ‘violation of the sacred nature of the home’ to be the ‘greatest curse of the factory system’ (cited in Rule 1986:168). I am not here straying from my central concern with time, but rather indicating that factory reform and in particular the short-time movement of the early nineteenth century had several languages, and that in the beginning at least, simply opposing work-time to leisure time was not the most important of them. The full discourse involved important matters of gender, health and childhood. In the early industrializations, driven by textiles, predominantly cotton, a high proportion of the factory workforce were women and children. If their routines underwent radical transformation, then this can only be assessed through comparison with the rhythms of women’s lives in the pre-industrial situation. Thompson perhaps assumes too readily that the artisan routines of craftsmen, miners, building workers, metalworkers and their like can stand generally for the era preceding industrialization. It is probable that they cannot. The likelihood is, however, that regular working with constant application outside the home was an even more radical adjustment for women and children than for men.

The first factory legislation was not directly concerned with time. It was about health: about the health of children. An act of 1802 entitled the Health and Morals of Apprentices Act, restricted the hours worked by the factory apprentices, the poor law orphans handed over to the cotton masters by the parish authorities. It had little novelty from a legislative point of view, in that it extended the centuries-old notion of the responsibility of the master for the health and welfare of his apprentice into the new sphere of the cotton mill. In this respect the Act of 1819 which carried protection to the so-called free children, that is those placed in the growing number of urban cotton mills by their parents, was more significant. However the huge and lengthy debate which preceded its passage was still essentially a debate about health. Factory hours were ‘unnatural’ in that they imposed a thirteen-hour standing day on children whose physiology could not bear it without harm.

Obviously concern with the health of children remained central to the campaign preceding the major Factory Act of 1833, but, alongside it, other concerns were enlarging the discourse and a feature of this enlargement was that it was increasingly gendered, for factories employed large numbers of women outside of the home. This,

according to Peter Gaskell in 1836, made the transition from the domestic textile system to the factory simply catastrophic:

Recklessness, improvidence and unnecessary poverty, starvation, drunkenness and parental cruelty and carelessness, filial disobedience, neglect of conjugal rights, absence of maternal love, destruction of brotherly and sisterly affection, are often its constituents and the results of such a combination are moral degradation, ruin of domestic enjoyments, and social misery.

(cited in Rule 1986:168–9)

Some of those from the West Riding woollen industry who gave evidence to the 1833 Commissioners actually spoke as if something of the old system could be maintained alongside a *controlled* factory system:

the more you shorten the hours in the factories (I mean where the power is applied) the more you enable the industrious and highly valuable domestic clothier to come near in competition with the opulent factory master.

(cited in Rule 1986:169)

In the main, however, the cotton textile workers, through their organizations were speaking a different language. (In Lancashire the domestic cotton manufacture had passed away a generation sooner than it had in the Yorkshire woollen districts.) In a basic political sense the seeking of a shorter working day came to be seen as the claim for a ‘natural’ right. Free time was time away from the authority of the factory master and the struggle to regain it was a struggle for freedom. As John Doherty, the leader of the cotton spinners and a very important figure in the history of factory trade unionism, put it, responding to the liberal economic orthodoxy that it was not for the state to interfere in a matter of private contract: ‘Is the personal liberty, or the actual imprisonment of a very large portion of the king’s subjects a mere matter of business?’ (cited in Cross 1989:33).

In economic terms, while nostalgia for the supposed virtues of the domestic system of manufacture was strong, the real issue had become less the survival of an older system of manufacture, than through the shorter-hour movement to shift the balance of advantage in the new system. In essence the struggle was over the labour market, for if the extra productivity of new machinery were given to reduced work-time, then it need not result in lower wages and in increased unemployment. The issue was given greater impact with the coming of the self-acting spinning mule, a connection specifically made by the Yorkshire Short-hours Committee in 1842. A Yorkshire voice put the matter explicitly:

Let us have the shorter time and invention will soon stimulate sufficient supply for our wants. The toils of the poor will be diminished and relaxation, health and contentment will predominate.

(cited in Cross 1989:29)

Pursuing what was in effect a radical restructuring of the labour market in the textile industry, adult male factory operatives were bound to move on through the reduction of child hours to seek a restriction of those of adult female workers and, indeed, to seek the removal of married women from the labour force, as well as to the direct regulation of their own working hours. Although it was not until the struggle for the eight-hour day was taking place in 1895, that *The Cotton Factory Times* 'came out' in this regard:

The veil must be lifted and the agitation carried on under its true colours. Women and children must no longer be made the pretext for securing a reduction of working hours for men. The latter must speak out and declare that both they and the women and children require less hours of labour in order to share in the benefits arising from the improvements in productive machinery.

(Webb and Webb 1914:338)

Significantly, when the campaign for an eight-hour day exclusive of meal breaks had begun among the Spinners' unions in 1867, the aim was to secure it through legislative control on the hours machinery could be worked: 'that such Eight Hours Bill have for its foundation a restriction on the moving power'. For the Factory Act of 1833 had not had the hoped-for effect. The operatives had reasonably expected that restricting children's hours would in effect mean the restriction of adult hours, since the two categories of labour had to work alongside. The factory masters, however, evaded this expectation by working children in two eight-hour relays, so that the adult day actually increased in some factories from thirteen to sixteen hours. Accordingly, agitation for a further act commenced and gained increasing momentum in the 1840s. Even the apparent victory in 1847 with the Ten Hour Act left some possibility of evasion and only the closing of loopholes six years later finally brought adult males a ten-and-a-half-hour weekday, and a Saturday half-day (Webb and Webb 1914:338-9; MacDonagh 1977:71-2).

So far as textile workers were concerned, a Saturday half-holiday was secured by legislation in 1853 instituting a 2 p.m. finish, although there is some evidence that earlier finishing on that day had been a customary concession for some time. But in the skilled trades outside the factory, notably in building and in engineering, the half-day had been achieved already through trade union pressure. The extent to which it was a 'trade-off' for St Monday is arguable. It is reasonable to suppose that it was, despite the fact that for some groups the two existed side by side down to the 1880s. For it was not simply a matter of registering a gain for the workers, the Saturday holiday was, once secured, recognized. It was 'respectable', formal even, in contrast to the dissipation and irregularity of St Monday. As such the gaining of the half-day can be seen as part of the unions' rise to respectability of the later 1860s: a remarkable change which was to bring them the recognition of a conservative government in the permissive trade union legislation of the 1870s.

Full Saturday half-holidays were steadily gained from the middle years of the

nineteenth century. By 1889 the factory commissioners could comment that its generality had at last made clear the

distinction...between the worker's own time and his master's. The spread of the half-holiday is clearly revealed in the history of organized football. The first season of twelve league clubs in 1888/9 was watched by a total of 602,000, the enlarged league of 16 clubs in 1895/6 was watched by almost two million.

(Rule 1994:24)

Once the Saturday half-day was secured, pressure was again applied to the length of the working day. The factory reformer Michael Sadler had argued in the debate before the 1847 act that the ten-hour day was historical, biblical and natural, even among prisoners and slaves: 'This natural regulation prevails everywhere, and has been observed in all ages.' But its achievement proved not to be a place to stop (Cross 1989:32). Over the 1870s with the engineering and building trades setting the pace, skilled workers secured the nine-hour day, though not like the factory workers through legislation, but through industrial strength, a notable example of which was the great engineers' strike of 1871 in the northeast. When the Webbs published their *Industrial Democracy* in 1897 they congratulated themselves that they had done so at an historic moment:

we stand at the present day in the first years of a general movement, which will result in the widespread adoption of Eight Hours as the standard working day in all branches of British industry. Here at last do we come to something like communistic feeling among British workmen. The aristocratic shipwright, pattern maker or cotton spinner, who would resent the idea that the unskilled labourer or the woman worker had any moral claim to as high a standard rate [of wages] as himself, readily accepts, when it comes to a question of hours, the doctrine of complete equality.

(Webb and Webb 1914:351)

This different attitude was, however, easily explained. In their contest with employers the skilled workers needed the works closed, and they and the unskilled to enter and leave at the same time: 'The most rigid class distinctions of the wage-earning-world have, in the matter of hours of labour to bend before the mechanical necessity for a Common Rule.'

By 1920, the Webbs' projection had largely happened: most workers had secured the eight-hour day, which, with only relatively small adjustments, was to remain the norm for another seventy years. Perhaps eight hours was the point of agreement with perceptions of a natural division of time: as the American Federation of Labour's short-time campaign of the last years of the nineteenth century succinctly put it, 'eight hours sleep, eight hours work and eight hours for what we will', or as on a watch case struck in Britain in the 1860s a little more sanctimoniously: 'We require 8 hours for work, 8 hours for our own instruction and 8 hours for repose.'

Few would contest the argument that a change in attitudes towards time on the part of the labour force was part of the process of early industrialization in England. Industrial economies in general, characterized by machine production and the factory system, do need more regular time-keeping from the workforce than did pre-industrial economic activities. Thompson, considering the underdeveloped economies of his own time, suggested:

What was said by the mercantilist merchants as to the failures of the eighteenth-century English poor to respond to incentives and disciplines is often repeated by observers and by theorists of economic growth, of the peoples of developing countries today.

(Thompson 1967:91)

Yet he was scornful of the instrumental attitudes revealed in the writings and prescriptions for an 'ideal workforce' of academic social scientists. However, while rejecting their tone, he nonetheless seems to accept much of their content. He is, for example, especially critical of Wilbert E. More, but More's assertion that 'work is almost always task-oriented in non-industrial societies' (Thompson 1967:92) is in fact Thompson's own starting point. Like the sociologists of Third World industrialization, Thompson assumes not just a need for change or adaptation, but a *conflict* between cultures. The problem here is that while the desired outcome may be generalized and reified to 'industrialism', the historical processes of actual change are determined by the particular pre-industrial cultures and social structures experiencing them. The English experience may be a model against which later industrializations can be examined, but it is not a template.

In England previous changes in agrarian society had largely replaced a land-occupying peasantry with free wage labour. There was no problematic attachment of the labour to the land. Thompson noted this contrast in drawing on work on Indian industrialization, but did not pursue it to significant conclusions (Thompson 1967:93). Writers on the early years of Indian industrialization certainly seem to describe a situation like that in eighteenth-century England. G.M. Broughton described the Indian factory worker in 1924 as:

a fish out of water in the strange environment of the town. He found it extremely difficult to adjust with the rigours of the factory work because above all, Indians are not accustomed to protracted, strenuous toil.

(cited in Sheth 1968:186)

The Indian sociologist, N.R. Sheth, observing in the 1950s an engineering factory in Gujarat, which he called 'Oriental', heard from older informants of the problems of labour discipline when the works had first opened in 1935 and had recruited its unskilled labour from nearby villages:

These villagers were largely ignorant of factory work or were afraid of the drudgery and routine involved in it. They therefore preferred casual employment which left them a lot of leisure. Some of my



informants narrated how they would go about now collecting fuel and fodder, now working on the farm of a landlord, now in the village grocer's shop and at times retiring for weeks together.

They also recalled that a man from Oriental used to go to their villages and persuade them to join the factory; sometimes he made ex gratia cash payments to those who accepted his offer to join Oriental. Even after joining the factory, people worked reluctantly and often left the job. Many of my informants described how some workers left the factory by jumping the fencing wall on an odd side without informing the supervisors, and never returned.

(Sheth 1968:78-9)

But this attitude soon diminished as landless villagers had no remotely equivalent opportunity of paid employment, and found that their factory employment brought enhanced status in the village. Even skilled workers, recruited from the higher artisan castes, soon became accustomed to good and regular pay, whatever their initial distaste for the working rhythms demanded to earn it:

Many of us may not like checking-in in the early morning or the searching eyes of the foreman, but the pay that we receive every month is very comforting and makes us forget the hardships.

(Sheth 1968:80)

The high comparative level and regularity of earnings meant that even those from more distant villages with some attachment to land, could accommodate that situation with the demands of factory employment. They retained many social obligations to their native villages; expressed homesickness, nostalgia and a desire to return home on retirement, but because of the costs involved in travel, loss of earnings and the gift expectations of their relatives, restricted their visits home to very special occasions like marriage, sickness or death. Where they had ancestral land, it was managed through relatives or hired labour and visits were managed not through absenteeism but on periods of official leave.

Contemporary accounts of textile mill workers, such as that of 1890, that they were 'naturally disposed to take work easily' because they were 'agriculturalists at heart' need to be qualified by the more recent findings of sociologists (Chandavarkar 1994:327). Sheth concludes that factory work usually meant an accommodation rather than conflict with their social world. Dr Chakrabarty, writing on the labour troubles in Calcutta's jute mills in the 1890s, has pointed out that strikes in 1895, when employers refused to give holidays for Muslim festivals, were not a lingering manifestation of resistance by a traditionally inclined labour force. The holidays had not been given in previous years and there had been no strikes then. Those of 1895 would seem to have resulted from an increased sense of solidarity deriving from a *growing* community consciousness among the immigrant workers (Chakrabarty 1981).

Employer production strategies depended upon a significant proportion of the labour force, whether willingly or not, to be available for casual short-time hiring.

The industrial process in England entailed a relatively rapid move to an urban/industrial economy. In India and elsewhere there was no process involving so complete or so rapid a separation between the agricultural and industrial sectors. Thompson, giving the example of India, wrote:

in countries where the link between the new factory proletariat and their relatives (and perhaps land-holdings or rights to land) in the villages are much closer—and are maintained for much longer—than in the English experience, [the problem] appears as one of disciplining a labour force which is only partially and temporarily ‘committed’ to the industrial way of life.

(Thompson 1967:93)

But the ‘problem’ has been seen somewhat differently by some recent writers on India. They argue that there was no wish on the part of employers to generally eliminate irregular work behaviour. As one female cotton winder explained in 1890, she had no difficulty in getting leave if there was plenty of yarn in stock, ‘But if there is a press of work even if someone died in her family she cannot get leave.’ Or as a male weaver put it, the owner could stop the machinery whenever he liked, and ‘he pays no compensation to the hands for sending them away in the middle of the day’. Recently Dr Chandavarker has pointed out that the apparent laxity of discipline in Indian cotton mills in the late nineteenth and early twentieth centuries need not be explained either in terms of ‘traditional and dysfunctional methods of management’ or ‘in terms of the rural mentalities of labour’. We are not dealing here, he suggests, with characteristics peculiar to new workers in early industrialization, but with enduring ones. The Fawcett Committee in 1928 certainly remarked on the employment of a good deal of casual labour over and above those usually employed in the mills, but this was to be a persistent feature related to a business strategy directed towards the adjustment of output to short-term market fluctuations (Chandavarkar 1994:327–9).

Thompson, as we have noted above, wrote of the pre-industrial economy that its work pattern was ‘one of alternate bouts of intense labour and of idleness, wherever men were in control of their own working lives’. From analogy with students, artists, and some of the self-employed he poses the question of whether this was not a ‘natural’ human work rhythm. Problems exist here with ‘wherever’ and with ‘idleness’. That industrialization imposed more regular working is true: that pre-industrial workers were characteristically condemned for their idleness does not seem to be so. ‘St Monday’ was also worshipped elsewhere, but possibly not to the same extent, or in ways which posed fewer problems. Eighteenth-century English workers seem to have been condemned in a discourse which was unique in its insistence and its intensity. Applying Thompson’s model to the American economy in the late colonial and early republican years, when the factory economy was being formed, David Brody found no echo of it. Contending that ‘silence serves perhaps as the best evidence’, he concluded that English holiday-making proclivities did not cross the Atlantic. Indeed the

linguistic usage most commonly applied to the American artisan was 'industrious'. There may have been no reason to accuse them of laziness, but they still resisted any attempt by employers to employ them for longer than their 'customary' hours. The nascent factory system after a period of accommodation and compromise, did seek to impose its particular time disciplines. An inquiry into the labour practices in a federal armoury in 1841 insisted that federal employees should come into line with what Brody calls the 'mainstream of American factory practice':

The pretext that because men work by the piece, they should be allowed to run the machinery when they please and be absent whenever it suits their whim, finds no favour at private workshops, nor can it be allowed where the work of one man depends on that done by another, for carrying on and keeping up all branches to a proper standard.

(Brody 1989:19)

In fact after an initial period of contestation, American factory workers quickly learned to fight the battle within the new context of sharply demarcated periods of work and leisure and to give a different meaning to 'natural right' in the context of time. Employers in the 1830s were largely achieving regularity of work, but, under pressure, were conceding their power to lengthen hours at will. The ten-hour day was achieved across a range of industries. In the contest for it, a labour spokesman wrote of contending for 'the Natural Right to dispose of our own time in such quantities as we deem and believe to be most conducive to our own happiness and the welfare of all those engaged in manual labour' (Brody 1989:46).

Even further from the time-disciplines which Thompson presents as characterizing eighteenth-century England, were those of late Tokugawa Japan which have been analysed by Thomas Smith. The industrialization of Japan which began in earnest after the Meiji Restoration of 1868, does not seem to have involved any deep conflict with labour over the issue of time. Over the previous period of Tokugawa rule, time-keeping habits had developed within the pre-industrial economy, which were perfectly congruent with the needs of the factory system. The Japanese peasant agricultural economy had a well-developed time economy which presented no problem for employers recruiting from the villages. Smith has argued that the new industrial economy as it emerged in Japan over the several decades following 1868, inherited a workforce with an appropriate sense of time: time was regarded as fleeting and precious and great moral value attached to its productive use.

The economic and social value already placed on the effective and cooperative use of time, he argues, calls into question Thompson's implicit assumption that all new industrial workers bring with them so casual a sense of time that they have to be *taught* its value. In Japan pre-existing time-attitudes not only survived the

coming of the factory, but became the basis of a formidable time discipline within it:

The acceptance of factory-time was not the result of the transcendence of a pre-industrial time-sense, but of the more or less untroubled adaptation of the older time-sense to the requirements of the factory.

(Smith 1986:189)

Smith poses the question of whether the Japanese case casts doubt on Thompson's characterization of pre-industrial time-senses generally, including eighteenth-century England (Smith 1986). It is just as likely that Japan and England both exhibit peculiarities. A study of another non-European example indicates no compatibility at all between the time-culture of a native people and that of their colonial employers who wished to form them into a satisfactory industrial labour force. Keletso Atkins has described the fundamental cultural clash in Natal in the middle and late nineteenth century between the temporal consciousness of the Zulus and the needs of white employers on the sugar plantations and in dock and other urban employments in Durban. Here 'master and servant' were not just racially distinct, but represented totally different social worlds and mutually incomprehensible logical systems. Conflict over time began with the employment contract itself. Employers sought to hire in European units of time-measurement, but Zulus had a year of thirteen moons, each of which had holiday and seasonal implications. Whites patronizingly referred to the lunar month as the 'Kaffir month' and their perception of the problem is revealed by a missionary in 1855:

The month of service...begins with the new moon, but then before it is quite completed, they will come to their master, asking for their money, and although the month is not ended they will declare it is by an appeal to the fact that the moon '*inyanga file*' is dead. They cannot understand there being more than 28 days in a month. It is impossible to make them believe there are 31.

(Atkins 1988:231)

A similar disagreement was responsible for a strike among mail carriers in 1858, who felt they were 'being cheated of their time' and insisted on their 'unwritten and ignorant system of computing time in opposition to the statements of the Postmaster and the interpreter'. The role of the latter is significant for there were frequent complaints that it was impossible to explain matters in the native language. Severe punishments in corporal and gaol form were imposed, although these seem to have had the effect of driving native workers from the labour market. Nor did Zulus readily offer themselves for hire over the western year. They divided the annual cycle into two distinct seasons of six moons: the rainy, or field-working season and the dry or winter season. Christianity was one medium through which

both the morality of hard work and an aspect of the western calendar could be disseminated. But even this and the fact that the Master and Native Servant Law of 1894 tried to bridge the gap by defining a hiring year of twelve months each with thirty days, was insufficient to bring out enough native labour to avoid the importation of Asian workmen (Atkins 1988).

Even when Zulu labour was successfully hired, problems still arose over the length of the working day. 'Kaffir time' could not accept working outside daylight hours. A different world of superstition and witches into which it was best not to venture came into existence with darkness. Nor would Zulus willingly leave their huts until the dew was off the ground, a customary view that seems to have developed from the association of malaria with wet ground. In time longer days were obtained by the employers from a mixture of incentives and from the fact that, in the towns at least, younger tribesmen came to associate some old-time beliefs with an older and different world and not as binding in their new environment. Acceptance of a degree of westernization among some sections of Zulu labour had two interesting results. It created the order problem of night-related 'undesirable' usages of leisure time. It also brought to some not just an acceptance of industrial time, but a recognition of the possibility of negotiating within it, over, for example, the Saturday half-day. Time was coming to be perceived in discrete market as well as in non-economic terms—like Thompson's English workers, the black labouring population came to calculate in terms of regular work-time, overtime and leisure time (Atkins 1988).

Sheth has suggested that the commonly applied models of industrialization are generally derived from western experience. Yet both 'industrial' and 'pre-industrial' societies are 'ideal' types:

The ideal type of the industrial society and its postulated antithesis, the non-industrial society, have generated the assumption that when machine technology is introduced into a non-western society it encounters a social structure and a culture different from those of the western society.

(Sheth 1968:175)

In fact, and the case of Tokugawa Japan may be the best example, industrial and pre-industrial societies may contain overlapping norms and values, and gradual processes of industrialization, such as in India where there is no transition to an economy generally characterized as industrial, can allow much social continuity. It does not seem, however, that such qualifications remove the value of Thompson's powerful insights, even if these were overwhelmingly based on the English experience. It is true that to talk of 'industrial society' is to invoke an ideal type. But variations from that type are not infinite and hardly ever fundamental. The labour imperatives of most historically experienced industrializations can be schematized, as in an influential text on industrial sociology, first published in 1960 under the heading *Universal Impacts of Industrialization on the Labour Force* (Kerr et al. 1973). But, as its authors recognize,

it is the more diverse forms of pre-industrial structures which particularize the processes of transition and, more precisely, the extent of conflict, overt or implicit, in the adaptation to and subsequent keeping of industrial time.

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## 6 *Developing an Indian stone age chronology*

SHEILA MISHRA

### INTRODUCTION

During the third World Archaeological Congress I presented a paper on Indian Stone Age chronology which was subsequently published in *Man and Environment* (Mishra 1995). That paper was a straightforward compilation and interpretation of the then available evidence for dating the major palaeolithic stages in India. In it I argued for a longer chronology bringing the ages for Indian lower, middle and upper palaeolithic stages into conformity with the recent dates from Africa and Europe. In the last five years this process of placing different sites and 'stages' in time has continued, but I am more and more struck by the fact that these reinterpretations depend as much on changing paradigms as they do on new data. In the original Congress paper I had emphasized the role of new data while now, five years later, I want to focus on the equally important role of changing paradigms. I do not want to be overly theoretical, but in this chapter I will discuss several case studies in which this interplay of new data and new theories and assumptions can be illustrated.

Archaeologists use two different kinds of information to interpret the age of archaeological sites. The first is based on the association of the artefacts with a particular context which can be related to the geological stratigraphy and geomorphology of the area. Archaeologists also define different archaeological entities (such as Lower Palaeolithic, Soanian, Acheulian) which they relate in time by their stratigraphical relationships, and also by their understanding of technological changes. This type of archaeological reasoning is similar to that of geology and shares the same historical development.

The second type of information is 'absolute' dating where rates of chemical or physical processes can be measured to give an estimate of the time since that process began. Depending on how well the rates are known and how well the effects of factors other than time on those rates can be estimated, these methods range from absolute, to calibrated, and then to relative. The methods of absolute dating are independent of the geological and archaeological records, and

therefore they can be a valuable check on the interlocking assumptions and associations which are at the basis of schemes of relative chronology.

The impact of absolute dating methods on archaeological chronologies has therefore been profound. However, it is important to remember that sometimes the results of such methods can be very inaccurate. Archaeological and geological assumptions about the age of a site are usually imprecise, but since they are built up from numerous observations they may be less subject to inaccuracy than the absolute dates can be. It is therefore important to use both sets of information in developing chronologies.

Techniques of absolute dating are a recent development for archaeologists the world over, and the first century of archaeological work had to depend on the geological and archaeological methodology alone. In India, as elsewhere, this was done first by defining technological stages in the Stone Age, and later by association of the contexts of these stages with quaternary climatic periods. Thus Foote (1916) divided Indian prehistory merely into Palaeolithic and Neolithic, while Cammiade and Burkitt (1930) subdivided it into four 'Series'. Sankalia (1971) adopted the European system of Lower, Middle and Upper Palaeolithic. De Terra and Paterson (1939) in the Potwar, Kashmir, Narmada and Madras areas, attempted climatic correlations on a large scale, while Zeuner (1950) made a more modest attempt at dating by correlating the geological and archaeological records in Gujarat.

## **IMPACT OF RADIOCARBON DATING OF THE INDIAN PALAEO-LITHIC**

The first absolute dating technique to become available in India, as in other parts of the world, was radiocarbon dating. With the setting up of radiocarbon dating laboratories at Physical Research Laboratory, Ahmedabad and Birbal Sahni Institute of Palaeobotany, Lucknow, Indian archaeologists began to obtain radiocarbon dates for archaeological sites from the late 1960s. Many of the samples for quaternary contexts were obtained and submitted by Rajaguru, at Deccan College in Pune. At that time a number of dams were being constructed and the dam foundation trenches gave excellent exposures of quaternary alluvium. Thus wood from the base of the alluvium exposed by the Mula dam foundations on the Pravara River was dated to  $>39,000$  bp (TF 217) and  $32,007 \pm 5710$  bp (TF 345). Samples from a small dam at Nirgudsar on the Ghod River gave dates of  $>31,000$  bp (PRL 609) and  $40,170 \pm 3296$  bp (BS 43). The Dhom dam on the Krishna River dated to  $38,769 \pm 9475$  bp (Possehl 1988), with the Jakawadi dam at Paithan on the Godavari River giving a date of  $19,025 \pm 666$  bp (TF 891) (*Indian Archaeology: A Review* 68/69:72). These dates were all obtained in the period 1967–72.

Prior to the availability of absolute dates, contexts with acheulian artefacts were routinely assigned a middle pleistocene age. However, if the stratigraphically oldest parts of the alluvial fills were within the range of radiocarbon dating it



implied that the Acheulian could not be very old. These dates were a big surprise and their effect was to change totally concepts of the age of pleistocene alluvium in western Maharashtra (Rajaguru personal communication).

Looking at the dates again after a period of twenty-five years it is worth asking why the infinite dates were rejected and the finite dates accepted. The Mula and Nurgudsar dam samples had infinite dates as well as the dates close to the limits of radiocarbon dating. This also applied to the dates from the Dhom dam, with only the Paithan date being genuinely Late Pleistocene in age. One explanation is that in 1970 there were almost no dates for the Acheulian anywhere in the world. Therefore the possibility that at least some phases of Lower Palaeolithic could be just slightly older than the radiocarbon dating method did not seem so impossible as it does today. In 1970 even the dates for Olduvai Gorge had not been widely accepted. The second explanation is that the Acheulian in western Maharashtra was associated at Nevasa with an industry, called the Nevasian, which Sankalia had identified as the 'type' site for the Indian Middle Palaeolithic.

## THE NEVASIAN

Sankalia's identification of a flake assemblage from Nevasa as Middle Palaeolithic led to the conclusion that the Acheulian in India is young. This 'Nevasian' occurred in the upper horizons of the same gravel as the Acheulian. Rajaguru and Pappu (1970) studied the geological context of the gravels at Nevasa and concluded that the Middle Palaeolithic and Acheulian at Nevasa occurred in the same geological context. Corvinus drew a similar conclusion, but she also pointed out that the flake component of the Acheulian was identical to the Nevasian (Corvinus 1968/9, 1983). Kumar (1985) systematically studied the nevasian and acheulian contexts in the Godavari Valley and concluded that they were the same. A geologist (Tripathi 1967) studied the fauna from the Nevasa localities and concluded that while the fauna would have been considered Middle Pleistocene in age, as it was associated with the Middle Palaeolithic it must be younger.

While Kumar, Rajaguru and Tripathi concluded from this similarity that the Acheulian was young, I argued (Mishra 1986) that in fact it was the Nevasian that was old. The Nevasian and the Acheulian do indeed occur in the same geological horizon, but the Nevasian is not a middle palaeolithic industry, but the flake component of the Acheulian in depositional contexts where the basalt artefacts are missing. Most of the handaxes were made on basalt, as large pieces of siliceous rocks are rare. Flakes are made on both the materials. Siliceous rocks like cherts and chalcedony resist weathering whereas basalt is easily weatherable. This means that where the basalt component has not survived, handaxes are missing. These are the Nevasian assemblages. Thus the acceptance of finite radiocarbon dates from the base of the alluvial fills exposed in dam foundations and the identification of a

geologically modified assemblage as Middle Palaeolithic led to the view that some of the Acheulian in India was very late indeed. It was the mismatch of this conclusion with the known age of Acheulian and Middle Palaeolithic elsewhere, and my belief that archaeological stages do not have such radically different ages in different regions, which led me to look for and find alternative explanations for the same data.

In looking for the reasons for the differing interpretations of the early 1970s and the mid-1980s, one obvious explanation is the better dating of the acheulian stage, at least in Africa, which made it much more difficult for Mishra in 1986, than Rajaguru and Pappu in 1970, to accept the contemporaneity of the Acheulian with the Middle Palaeolithic. Sankalia's original misidentification of the Nevasian also has to be seen in the context of his attempts to build up a sequence of stone age phases in India. While acheulian artefacts are found in many places in stratigraphic context, the same rarely applies to middle palaeolithic artefacts, although surface sites are common. Sankalia selected Nevasa as the type site because it was one of the few sites where a flake assemblage could be found in a stratigraphic relationship to an acheulian assemblage. In his earlier work on the Sabarmati River in Gujarat, Sankalia (1964) had been unable to identify any assemblage to fill the 'gap' between the Acheulian and the Mesolithic, but the presence of flakes in the gravel at Nevasa neatly solved his problem and rescued his ideal sequence.

## DATING THE ACHEULIAN AT BORI

In 1988 a tephra was discovered at Bori on the Kukdi River (Korisettar *et al.* 1989), where an early acheulian assemblage had previously been reported (Kale *et al.* 1986). For the first time the opportunity to date the Acheulian by an 'absolute' method presented itself. The tephra was initially dated to 1.4 myr by the potassium argon (K/Ar) method. Uranium thorium (Th/U) series dating of the tephra also showed it to be older than 350 kyr (Korisettar *et al.* 1989). As most of the artefacts were above the tephra horizon the association of the archaeology with the dated horizon was of prime importance. In 1993 the Bori tephra was dated by Horn *et al.* (1993). They found that the magnetic fraction gave an anomalously high age of 15 million years and the non-magnetic fraction gave a date of 640 kyr by K/Ar. Fission track age of 540 kyr, although with very large errors, was in agreement with this age. As the dating by Korisettar *et al.* (1989) had not removed the magnetic fraction, the discrepancy between the two dates is explained by the presence of the anomalously old magnetic minerals. Further argon argon (Ar/Ar) dating of the tephra was done on the non-magnetic fraction by Mishra *et al.* (1995) obtaining a date of 670 kyr. The clay covering the acheulian-bearing gravel was interpreted as being continuous with a nearby exposure 50 m away from the river where the tephra, but not the gravel, occurs in a clay section. The dated tephra and gravel with artefacts are lenses within a clay and therefore belong to the same time horizon.

This laboriously obtained dating and stratigraphy was then challenged by geologists (Acharyya and Basu 1993) who correlated the Bori tephra with the 75 kyr Toba eruption on the basis of chemical similarities, and asserted that the Bori dating was 'erroneous'. Mishra and Rajaguru (1994) have defended their dating of the Bori tephra on the basis of the archaeological associations (the acheulian artefacts overlie the tephra layer), while Badam and Rajaguru (1994) questioned the associated biostratigraphy. Shane *et al.* (1995), on the basis of further chemical work, support the correlation of the Bori tephra with the 75 kyr Toba eruption with a further defence of the original date by Mishra and Rajaguru (1996). Therefore, at the moment, the validity of the absolute dating at Bori is supported by the archaeology rather than the archaeology being dated by the tephra. Thus two different disciplines have arrived at contradictory conclusions, and it is the adherence to different paradigms by the various parties which underwrites those conclusions. Thus I do not expect the Early Acheulian in India to be younger than 75 kyr when it is older than 1 myr in Africa, while the geologists expect chemically similar tephras to be of the same age and thus accept a 75 kyr age for the Bori tephra.

### **BRITISH ARCHAEOLOGICAL MISSION TO PAKISTAN**

In the early 1980s the British Archaeological Mission to Pakistan sought in the Siwalik formations of Pakistan (Dennell 1984) for evidence of human occupation comparable in age to that in Africa. At that time no sites outside Africa were widely accepted as being older than 1 million years. The investigators did indeed find a number of artefacts from the Pabbi Hills region on surfaces dating from 2.5 myr to 1 myr (Dennell *et al.* 1988a, 1988b). Their most convincing evidence was from the Riwat locality where an *in situ* artefact was found in tilted normal sediments underlying a reversed sequence (Rendell *et al.* 1989). On the basis of the palaeomagnetism and known age of the tectonic events, the site was dated to about 2 myr. However, despite the robustness of this evidence, in practice it was offered very hesitantly. Thus the artefacts from the Pabbi Hills were classified on the basis of how many criteria identifying them as artefacts they fulfilled. The Pabbi Hills material is not included in the final monograph (Rendell *et al.* 1989).

Subsequent to the work of the British team, early dates from sites in China, Indonesia, Europe and Central Asia have been generally accepted. I think that the hesitancy which I sense was due to the fact that when the work was reported it challenged the idea that there was a large time gap between the earliest sites in Africa and the earliest sites elsewhere, and despite there being no really valid argument against accepting the evidence, these localities are still not widely cited in discussions of early sites outside of Africa. My own attitude to this research has evolved, just as that of other people, from amazement at such early human presence in the Indian subcontinent to an expectation that more such evidence will turn up with further research.

## THE SOANIAN AND THE ACHEULIAN PROBLEM

One of the most interesting problems is the 'Soanian' in northwest India. In years before the Second World War European and American archaeologists working in Asia developed the concept of a distinct difference in the lower palaeolithic 'traditions' in Asia compared with western Europe and Africa (De Terra and Paterson 1939; Movius 1948). Thus the acheulian bifacial tradition was distributed in western Europe, Africa and Peninsular India, while the chopper chopping tool tradition was found in China and South East Asia. The Indian subcontinent was the boundary between the two traditions with the Soanian belonging to the chopper chopping tool tradition and the Madrasian to the Acheulian. The absence of the Acheulian in northwestern India was shown to be wrong in the early 1980s when Mohapatra found a number of acheulian sites in the Siwalik frontal range near Chandigarh (Mohapatra 1981, 1982, 1997; Mohapatra and Singh 1981). Additional sites were found by some members of the Geological Survey of India and by Kumar and Rishi of Rotak University (Kumar and Rishi 1986).

Recently I was preparing a review of the South Asian Lower Palaeolithic with Gaillard (Gaillard and Mishra in press). It was in re-reading the old publications and trying to interpret the archaeological data from the sub-Himalayan region that we recognized a very important fact, which had been reported by everyone, but the significance of which had been ignored. The Soanian and the Acheulian occur in contexts of different ages. There is absolutely no evidence for them to be considered similar in age to each other. Almost all the finds of artefacts are surface finds; in the case of the Soanian it was taken for granted that they are derived from the erosion of the deposits they occur on, while for the Acheulian no such assumption was made. The Acheulian is found only on the surfaces of late Siwalik outcrops, or in the small streams draining these outcrops, while the Soanian is found in and on the river terraces and Dun valleys formed by the uplift of the Siwaliks.

It was only when Mohapatra began to explore the Siwalik frontal range that he located acheulian sites (Mohapatra 1981). While he recognized the distinct contexts of the Acheulian and Soanian this tended to reaffirm the concept of their belonging to distinct contemporary entities, as it was felt that the different distributions were due to preferences of different environments occupied by the 'Acheulians' and 'Soanians' (Mohapatra 1990). Rendell, Dennell and Halim (1989) have also reported acheulian artefacts from the Jhelum region. Looking at the same data from the perspective of the late 1990s rather than that of the very early 1980s (Gaillard and Mishra in press), it seems that the essential differences are that the Acheulian is found in an earlier context, and that the Soanian is confined to the post-Siwalik depositional context. Therefore the Soanian/Acheulian debate is entirely misplaced. The Soanian is indeed a distinct entity from the Acheulian, but they are not contemporary.

## CONCLUSIONS

This chapter has been an exercise in critical reflection, realizing how the same data can be interpreted in different ways even by the same person. Although I disagreed with many people, reinterpreting Sankalia's Nevasian, rejecting the late quaternary age of the alluvium in upland western Maharashtra, interpreting along with Gaillard the Soanian and Acheulian as belonging to different times rather than different contemporary hominids, I am very conscious that all of us are in the same 'game'. Most of the people I have disagreed with have been my teachers and it is in trying to understand why there should be such differences that I have written this chapter.

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## 7 *Appraising the urban future: an archaeological time perspective*

ROLAND FLETCHER

### INTRODUCTION

If industrial cities have a finite capacity for growth, beyond which they cannot sustain viable behaviour, and we can find out what it is, then we would have a way of appraising their prospects of continued development. We would also be able to predict the overall incremental effects of growth and perhaps be able to judge when we should rein in settlement growth or change the density trajectories of our cities to avoid adverse behavioural effects. A predictive model of the behavioural limits on viable community life set by settlement area and residential density should therefore be of some relevance, especially for analyses of the potential impact of urban development. An operational uniformitarian proposition is required which specifies the relationship between the behavioural boundary conditions and the consequences of approaching them. To assess such a model a time-scaled perspective is required which will allow us to identify the rates of change associated with the long-term boundary conditions which constrain viable community life in human societies.

We can observe that some contemporary cities are in dire straits and we may incline to the view that they should not get any larger. But we do not have a paradigmatic indicator which tells us that they are actually approaching the limits of their operable size. Bad living conditions, ill-health and social disturbance have long characterized urban life (Cohen 1989). Imperial Constantinople in the sixth century AD, which was rather small (Mango 1985; Mango and Dagron 1995), and late Abbasid Baghdad in the ninth century AD, which was very extensive (LeStrange 1900; Lassner 1970), were hardly paragons of civil order. Living conditions in contemporary communities, bad as they can be, do not in themselves suggest either that our cities are beginning to fail or that they have reached the limits of their growth. We may wish to slow down their growth but if we are to do so we need to assess whether we are trying to stop massive potential growth, can intervene as behavioural inertia slows growth, or are merely about to put a brake on a system which is due to run down of its own accord.

A time-scaled perspective and cross-cultural comparisons are required to

gauge where urban growth may be at any given point in time (Fletcher 1992). Knowing that the largest Chinese cities reached areas of 70 to 90 sq km on several occasions during the past 1,200 years (Steinhardt 1990; Fletcher 1995:203–12) with populations of around a million helps to put the minuscule scale of most European pre-industrial cities in perspective (Fletcher 1986). Only in the nineteenth century did London and Paris begin to rival the size of the great Asian cities, and in the early nineteenth century Edo in Japan was the most extensive and most populous city on earth (McClain *et al.* 1994). Clearly, agrarian-based capital cities could reach sizes well in excess of those in which industrialization was first harnessed to urban growth. Great size did not therefore generate an economic transformation as an ‘adaptive response’. The behavioural and economic components of the ‘Industrial Revolution’ began in very small towns and turned out to be a solution to the ‘problem’ of exceeding a compact settlement area of about 100 sq km and a maximum residential population of 1 to 2 million people. Once one knows that European cities were approaching that limit and crossing it in the mid-nineteenth century the crises of early industrial life can be viewed in a different way and the implications of what those settlements were beginning to do become manifest.

What is therefore consequential for our perspectives on the future is a sense of the scale of the possible or potential transformations of industrial urban systems and a prediction about the limits on that growth. What is not useful is a claim that what has happened in the past will happen in the future just on the basis of a substantive aggregation of examples. What is required is an operational explanation of the constraints on growth and what happens when those constraints are either approached or obviated by novel behavioural phenomena. Deterministic, directive causal explanations in which circumstances create solutions are untenable. Instead we need to use models of boundary conditions from which we might predict the differing outcomes which may result when diverse kinds of communities collide with those limits.

There are two possible ways to approach this question, both of which can be integrated into a single perspective. First we can devise a theoretical model of the interaction and communication functions upon which community life depends, to predict the kinds of constraints which limit settlement growth. Second, we can look at the past 15,000 years of settlement growth to see what it might tell us about the prospects for the future expansion of our settlements. The easier introduction is to look at the substantive pattern first.

## **RATES OF SETTLEMENT GROWTH**

Over the past 15,000 years there have been three major jumps in settlement size. The first two, associated successively with what we call the development of sedentism and the rise of urbanism each led to an order of magnitude increase in the maximum extent of compact settlements. The increases appear to derive from shifts in the way interaction and communication was managed, combined with a



major economic change. The third jump in settlement size began in the mid-nineteenth century during the 'Industrial Revolution'. Substantial changes in communication technologies, such as trains and mass media, occurred in conjunction with massive economic changes in agriculture and in industrial production. If this most recent jump in size permits a proportionately similar degree of settlement growth as its predecessors, then we might be able to estimate the maximum viable extent of compact, industrialized cities.

Until about 10,000 years ago settlement sites were generally less than 3,000 square metres (sq m) in extent and few reached areas of 1–2 hectares (ha), 10,000–20,000 sq m. While some hunter-gatherer communities have attained settlement sizes of up to 5–10 ha in the past 8,000 years, few have reached sizes in excess of 25 ha, and they have only done so by dropping to lower and lower average residential densities. A few mobile communities have reached immense sizes, among them the Plains Indian summer encampments, the Ethiopian mobile capitals and the Mongol *orda*, but again only by massive areal dispersion of the resident community (Fletcher 1991). By contrast, clearly sedentary, agrarian communities habitually produce compact settlements with areas of up to 30 ha and have occasionally produced large settlements of 70–100 ha. It appears that when the growth of permanent, sedentary communities became possible a constraint on settlement size was removed which allowed an increase in maximum size from about 1 ha up to about 100 ha (1 sq km), an increase of a hundred times. This new maximum size seems in turn to have marked a major constraint on growth. The sizes of western and northern European settlements were predominantly less than 30 ha for the 4,000–5,000 years prior to the Roman conquest. A few reached sizes of 80–90 ha. During the growth of urban communities compact settlements of up to 30 sq km became relatively common and some even reached immense sizes of 80–100 sq km, such as T'ang dynasty Ch'ang-an (Wright 1967; Seo 1986; see Figure 7.1) in the ninth century AD. Urbanism allowed a jump in settlement sizes to magnitudes a hundred times larger than had previously been possible. Similarly, the Industrial Revolution allowed compact cities to rapidly exceed the previous world-wide maximum of 100 sq km which had prevailed for at least the preceding 1,200 years. However, the previous great jumps in settlement size which are associated first with the initial formation of permanently sedentary, agrarian-based communities and then with the initial rise of agrarian urban communities, indicate that the rate of increase goes up by a thousand times for each such transition with the maximum rate of growth for industrial urban settlements reaching 5,000 sq km per century (Fletcher 1986). At these rates of growth the minimum possible time which might be taken to reach a new limit on the viable area for compact settlements is reduced with each major jump in settlement size (Fletcher 1995:226).

To provide a convention for discussion I will use the estimate that each time a release on settlement growth for sedentary communities has occurred

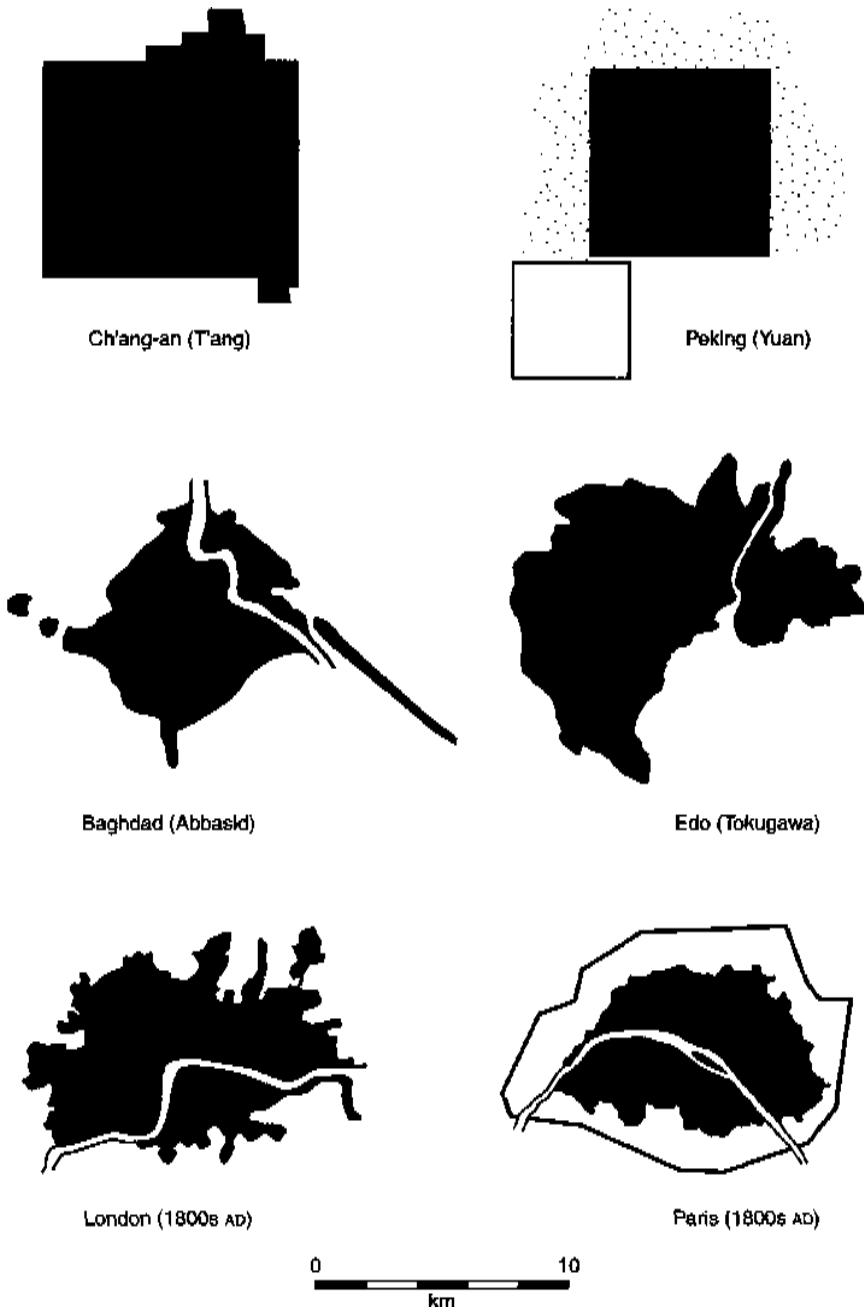
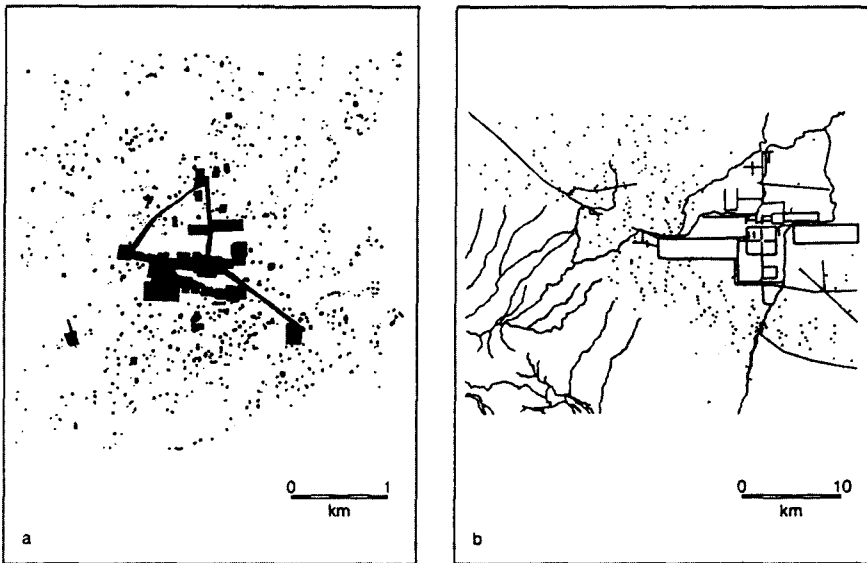


Figure 7.1 The largest compact pre-industrial cities

it has permitted maximum size increases of about 100 times and an increase of up to about 1,000 times in the rate of growth. The broad social transformations associated with permanent sedentism, agrarian urbanism and industrial urbanism each contained a particular abrupt, consistently scaled punctuated change in settlement growth. If the process continues in a regular fashion this suggests that industrial urban sizes of around 10,000 sq km may be feasible. But these will be close to the viable limits of development on existing economies and modes of interaction and communication. This is presented as a conventionalized first approximation, which will need further substantial analysis and the use of an elaborate comparative methodology.<sup>1</sup>

Dispersed sedentary settlements, by contrast, do not display such marked size limits. The largest Maya cities of Yucatan, such as Tikal, in the tenth century AD (Puleston 1974), exceeded the areal extent of early, compact industrial cities and the great Khmer urban complex of Angkor extends for several hundred sq km around the highly visible monumental core (Jacques 1992; Moore 1995; see Figure 7.2). Similarly, Zimbabwe, in the fifteenth century AD (Sinclair *et al.* 1992), in southern Africa was bigger than the early, compact Mesopotamian urban settlements of the third millennium BC which were managed using literacy. The notable feature of dispersed settlements, however, is that they do not appear to be a flexible growth option. Instead they are characterized by the absence of local successors of equivalent form. Nor do they transform into



**Figure 7.2** (a) Tikal (central area), Yucatan, Mexico, first millennium AD: monumental core and residential cluster; (b) Angkor region, Cambodia (lines represent the capital city area in the thirteenth—fifteenth century; dots represent modern villages)

compact settlements of similar size. Instead the regional growth histories are characterized by abrupt disjunctions.

The issues that we need to consider are whether we have any theoretical reason for supposing that the magnitudes of growth, and their form, will be repeated and whether there are limits on the maximum viable size of compact settlements which a given economic and behavioural system can sustain. This can be assessed by considering a model of the behavioural parameters on viable interaction and communication within human communities.

### **BEHAVIOURAL PARAMETERS OF VIABLE COMMUNITY LIFE: A MODEL OF INTERACTION AND COMMUNICATION STRESS**

These parameters derive from the finite storage and analytic capacity of the human sensory system,<sup>2</sup> combined with the inherent lag and inertia of information transmission. After a while continued input leads to incoherence of response whatever the specific capacity of the sensory system, while delay times and information loss continually affect communication. There should therefore be limits on the aggregate capacity of a community to control interaction and aid communication coherently. A finite tolerance of input within a finite period of time sets the limit on the amount of interaction which we can manage and the range over which a communication system is effective. The parameters can be given a material, quantitative form because they are a function of rates of activity, numbers of people, amounts of space and the degree of material inertia incorporated into the fabric of the settlement.

What is now required is the identification of the empirical characteristics of those parameters. From these we can specify the conditions under which communities will fail to operate adequately as intra-communicating entities. The interaction-communication stress model (I-C model) predicts a succession of communication limits and the existence of a limit on aggregate interaction. The two kinds of limits are general boundary conditions for community life. Articulated into an operational uniformitarian model (Fletcher 1995:230–1) they provide an explanatory framework for the study of settlement dynamics.

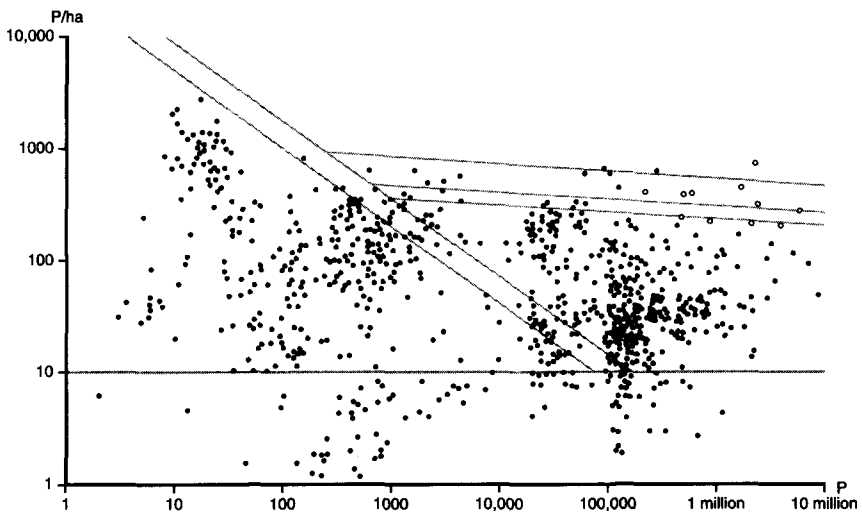
#### **Interaction**

The occupants of a settlement interact with each other in aggregate as well as face to face. We are affected by the consequences of other people's actions whether or not we wish to acknowledge the fact. Traffic speeds, queuing for cinemas and the effects of pollution are irritants produced by the aggregate interaction between all the people who conduct their lives within a city.

If human groups can only tolerate finite amounts of interaction, because neither social diversion nor the available classes of material control possess an

unlimited capacity to manage behavioural stress, there will be an upper limit on the residential densities which can be carried by a community. As more people are packing into a finite space so the incidence of the interaction events between them will increase until it reaches an uncontrollable intensity. An expression of the limit should therefore show up as a constraint on the maximum operable residential densities (Fletcher 1981:98; 1995:70–82) beyond which human communities should have difficulty in persisting (I-limits). Such an interaction limit should be relatively intractable and quite conspicuous.<sup>3</sup> If the constraint remains constant then we should find that the density ceiling decreases with an increase in community size because, as people aggregate in larger numbers they will need, on average, more space per person to mitigate the increasing interaction load. The number of possible interactions increases far more rapidly than the absolute number of people involved (Johnson 1982:392). A grab sample from the past two millennia suggests that an approximate upper density limit, which declines as community size increases, can be recognized for the familiar class of permanent sedentary communities living in agrarian villages and in towns or cities (Figure 7.3).

### Communication



**Figure 7.3** Samples of population/density data from human communities over the past 2,000 years; includes small mobile hunter-gatherer communities, agrarian villages, agrarian urban and industrial urban communities (see also Figure 7.4)

Communication includes all the varied signal systems which human communities use. Because of our finite sensory capacity, cumulative errors during message transmission, inertia in traffic movement, operational constraints on signal transmission and a finite energy supply, communication systems can only be effective over a finite range. For instance, each mode of communication, whether ordinary speech or an electronic system, requires a given amount of energy in order to function. With that energy quota the system can transmit information over a finite range. Speech, for example, will suffice for communication over a small range while the energy invested in telecommunications-communications enables us to talk at high intensity across an entire industrial city.

The limits of communication effectiveness can therefore be envisaged in terms of settlement area. The effective limit is the maximum settlement area over which a given assemblage of transmission mechanisms can function adequately to carry coherent messages clearly and promptly enough to operate adequately as a communication network, and to move people or items sufficiently fast to arrive in due time. The operable settlement size limit represents a size beyond which a significant number of the messages carried by the communication system will be lost or garbled during transmission, and the movement of people becomes significantly unworkable.<sup>4</sup>

We should then expect that communities with a given communication assemblage may expand the size of their settlement up to some maximum area constrained by the adequacy of their overall communication system (Fletcher 1981, 1995:82-91). Growth beyond that maximum area could not be sustained for long because the community would be unable to maintain the transmission capacity and efficacy needed to remain workable. Loss of communication effectiveness will prevent the integration of the activity which could expand the settlement area. We should therefore expect to see the effect as a constraint on the growth of settlements. It will be most conspicuous in compact settlements where the communicators are close together and thereby generating stress from the overloading effect of their proximity. Transmission capacity is most likely to fail in circumstances which involve high signal loads and a high incidence of obstacles to transmission. In conjunction with the I-limits we should find areal limits on communication (C-limits).

We ought therefore to find that communities using a particular suite of transmission devices will be able to sustain a maximum settlement area which is relatively consistent world-wide. Rather than a maximum community size defined by the supply of resources we should find a succession of maximum feasible settlement areas, as is indicated by the last 15,000 years of settlement growth. If successive interaction-communication assemblages each have a finite, maximum, compact settlement area which they can sustain, then the history of settlement growth should include a distinct maximum of settlement size for each successive major communication transformation. The difference between two hypothetical successive C-limits therefore represents the settlement size range for which a given assemblage is essential as a viable communication system. For

example, literate, agrarian urban communities grew beyond the 100 ha C-limit but could not produce compact settlements in excess of 100 sq km.

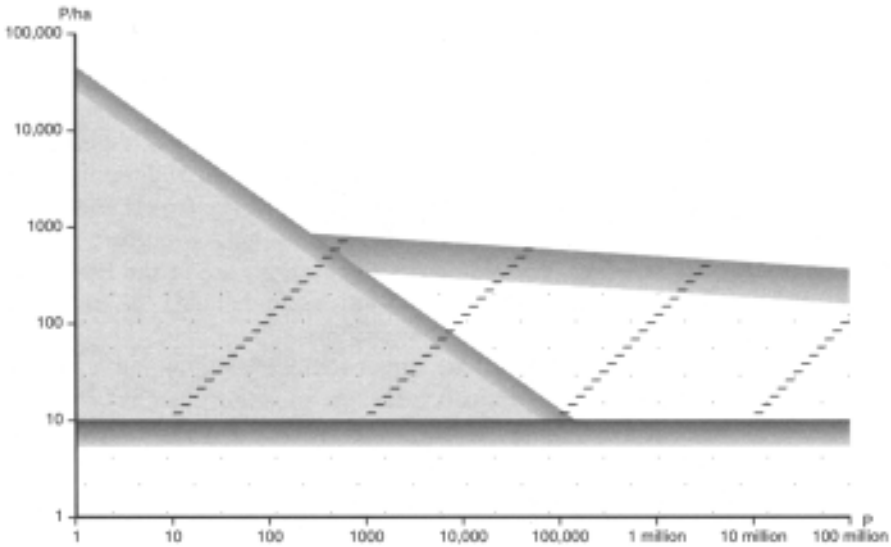
A simple explanation can then be offered for the proportionately consistent relationship between the successive C-limits. When a community approaches a C-limit it is under considerable behavioural stress. A new material assemblage which allows a transition across a C-limit must be able to provide relief from those stresses. It will therefore possess the potential to aid communication and interaction proportional to the stress which it mitigates. That enormous potential is then available to be converted into the management of increased numbers of people on larger settlement areas but at much lower residential densities where the behavioural stresses are relatively low. The amount of increase which the new assemblage can sustain should therefore be proportionate to the stresses associated with the preceding C-limit. The C-limits ought to be consistently scale-related because each new interaction-communication assemblage overcomes the stresses of one C-limit and simultaneously defines the magnitude of the next C-limit.<sup>5</sup>

### **LOW-DENSITY, DISPERSED SETTLEMENTS**

At very low residential densities the communication constraint should not apply. When there are very few people per unit area associational friction is limited and a communication constraint on settlement size cannot apply. As interconnections are reduced by the amount of open space between residence units we should find that communication loses its powerful role as a regulator of settlement size. A density threshold (the T-limit) should therefore exist below which the communication system used by a community ceases to exercise a consequential constraint on settlement size (Fletcher 1995:92–5). The threshold will be defined by our maximum rural regional population densities. The extent of a rural region is clearly not defined by interpersonal relationships.<sup>6</sup> The maximum densities lie at approximately 5–10 p/ha for extensive sample regions (see Figure 7.3, and Clark 1989). Settlements whose occupation densities drop to the level of regional densities should not be subject to the C-limit effects, and will be able to attain areas far in excess of the specified maximum size of compact settlement for a given communication assemblage.

### **THE NATURE OF SETTLEMENT GROWTH**

The I- and C-limits along with the threshold (T-limit) can be plotted together to define a stress matrix (Figure 7.4) across which settlements move (Fletcher 1995:95–8). The stress matrix summarizes the proposed behavioural constraints on the growth of human communities and the current indications of the position of the various limits. They are represented as zones because they are not rigid, deterministic, instantaneous halt lines. Rather, the zones are indicators of an uncertain range of



**Figure 7.4** The interaction-communication stress matrix (diagonal dashed lines are C-limits; the other two sloping shaded lines are I-limits; the horizontal shaded line is the threshold limit)

likelihood within which the behavioural limitations become severe.<sup>7</sup>The I-C model is not deterministic because it specifies that strict constraints only apply at the limits at which human communities can operate. Nor does the presence of severe stress predetermine that a community will devise effective solutions to its problem. The conditions set by the model are selectionist. What the model does rule is that the proposed behavioural parameters will define the distribution of settlement sizes and should have a restrictive effect on the outcome of the behaviour of a comparatively minuscule, though crucial category, of large settlements whose trajectories approach the I- and C-limits (Fletcher 1995:99–125). What may happen at the limits should be predictable from the general operational principles inherent to the model. The implications of being able to ask this kind of question are considerable. With more precise estimates of the previous C-limits and a rigorous cross-cultural designation of residential density to identify the I-limits more exactly we might begin to predict the duration, maximum size and behavioural limits of future settlements in similar situations. What can be done with this first approximation is to outline the implications of the model as a guide to whether or not we need concern ourselves with further inquiries.

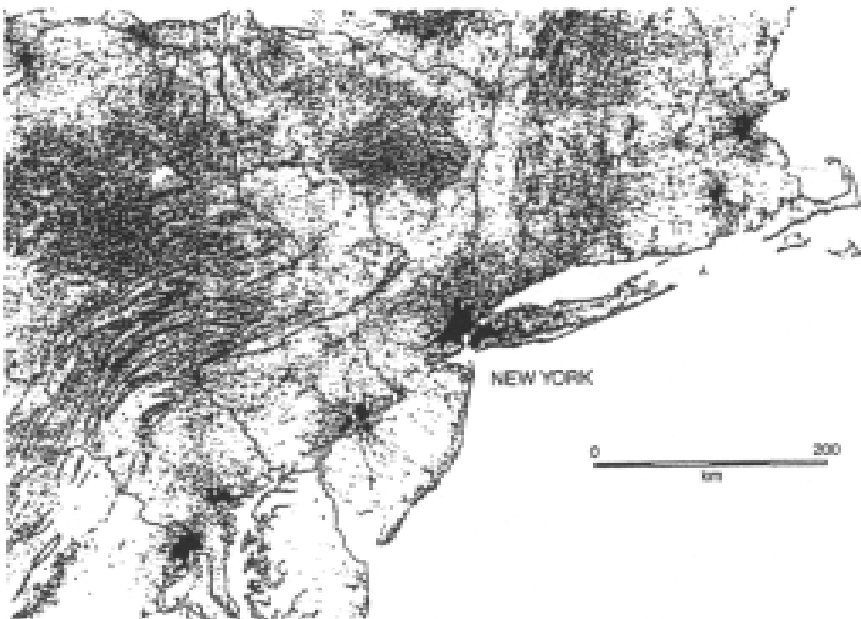
## FUTURE URBAN GROWTH

The issues of urban development can now be reviewed on a very broad temporal canvas, to complement the detailed analyses of specialists concerned with transport, health, social welfare, economics and pollution. My viewpoint cannot

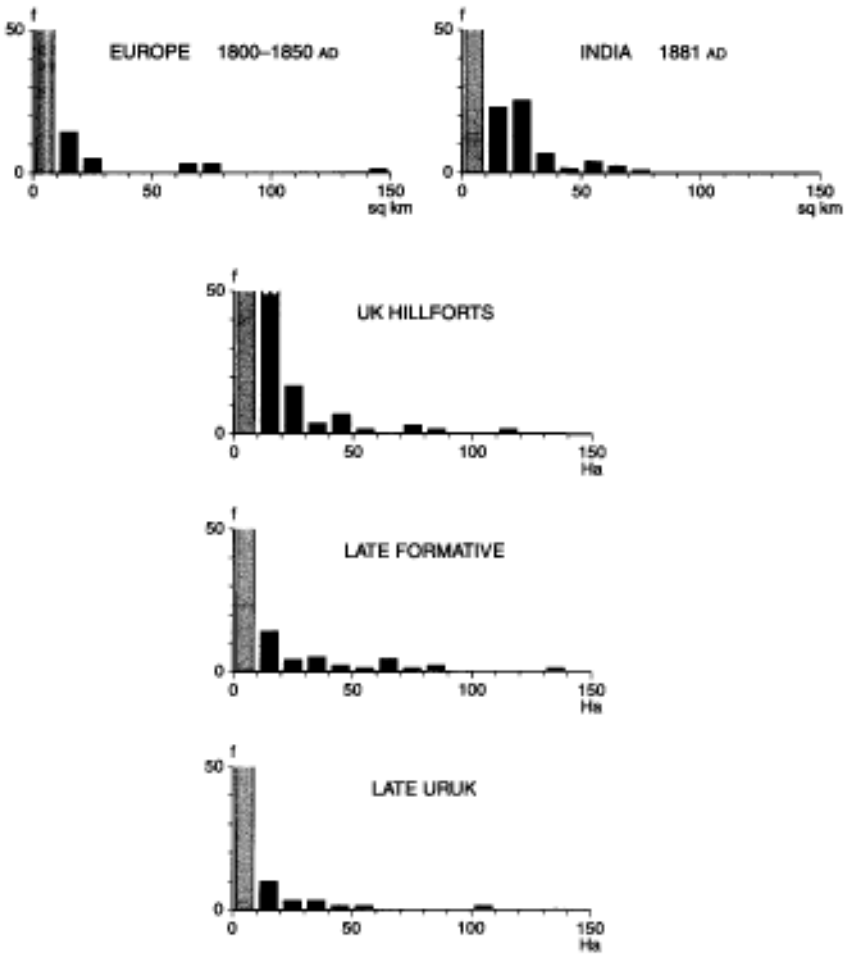


provide solutions for specific instances and communities because these must necessarily be politically effected in the contextually unique milieu of each society. Instead this approach seeks to place specific strategies in a more general, comparative context—to give them a frame of reference. On the stress matrix we can plot several different growth trajectories. A few cities, such as Hong Kong, have moved along the I-limit for their entire existence. In most OECD countries a general trend toward decreasing urban residential densities is occurring as community size increases (Dogon and Kasarda 1988). Some cities, especially in the USA, have dropped to average densities of 10–25 p/ha. Sydney has been running in that range at least since the 1940s. In the main, the larger cities of the OECD are not operating at high average densities. Where conurbations have developed from the merging of several cities the averages are in the low range. Some cover an enormous extent, the most obvious example being the East Coast megalopolis in the USA (Gottman 1961; Figure 7.5).

Behind a C-limit, settlement sizes are distributed in a hollow curve (Figure 7.6). As we might expect most are small, a few are medium sized and very few get into the upper size ranges. What this suggests from a standard selectionist perspective is that selective pressure against growth becomes more and more intense as size increases. Rare cases in unusual circumstances, whether by chance and/or control of substantial resources, can become very large but most are unlikely to do so. The corollary is that as settlements move toward a C-limit they are subject to ever more intense I-C stress. In terms of the matrix, as they increase



**Figure 7.5** The East Coast megalopolis—1960s



**Figure 7.6** Settlement size distributions—top: for Europe and India in the nineteenth century AD as industrialization began; bottom: distributions prior to or just at the start of the formation of literate urban communities

in size they become more liable to failure due to internal communication failure. If they move to increased density they become liable to the stresses of increased interaction frequencies. The best options would be to stay well away from both limits. The worst would be to simultaneously approach both.

Trajectories which approach the I-limit seem to produce a ricochet effect (Figure 7.7). This limit is apparently intractable—presumably due to a combination of our behavioural characteristics and the nature of our current material assemblage. A C-limit, by contrast, can be crossed if a new, material interaction/communication assemblage has been developed, as can be seen for London and Paris during the Industrial Revolution (Figure 7.7). However, a

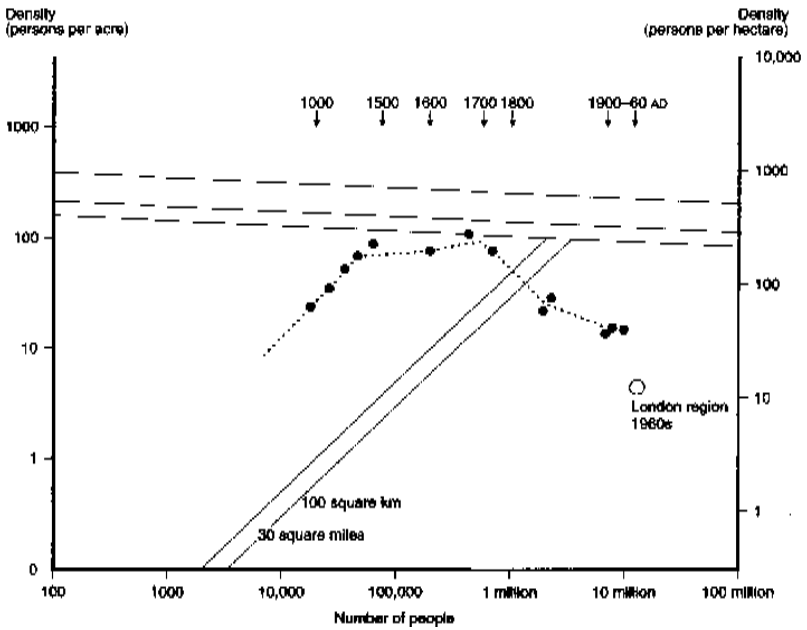
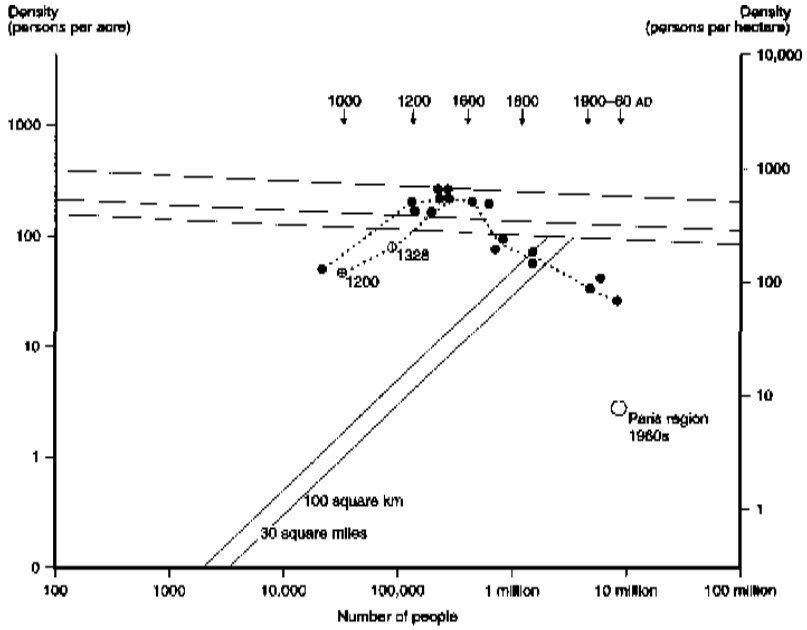


Figure 7.7 Trajectories for Paris (top) and London (bottom) (C-limit is double diagonal line; I-limit is represented by the three upper parallel lines)

trajectory which approaches a C-limit and then moves up toward increasing density as the community continues to grow, as did Abbasid Baghdad and T'ang Ch'ang-an, is approaching the intractable I-limit and has little prospect of avoiding an I-C crisis. The only option would be an extreme change to areal expansion away from the city's overall trajectory. Such a growth would swiftly hit the C-limit, allowing no leeway if novel communication systems are not already in place. The other option is a trend toward low densities, to pass below the T-limit and continue to grow to a vast extent, way in excess of the C-limit. However, the community is then in a trap because, unless it obtains a new I-C assemblage from somewhere, it cannot shift back up to higher densities. A decrease in its population would enable the community to get back behind the C-limit but is unlikely to be achieved while maintaining economic viability. Whatever other factor was causing a population decline would itself be an indicator of impending or actual crisis. Extensive, low-density cities on a bypass trajectory should therefore be liable to stabilize and should lack the potential for coherent major spatial transformations into smaller settlements. Change is likely to be disjunctive, probably seriously so.

In this chapter I will restrict my review to the problems associated with increases in the areal extent of settlements. Given the shape of the size distribution behind a C-limit, most industrialized cities should lie in the lower third of the size range, i.e. smaller than 3,000 sq km, which is where we find most industrialized cities. Far fewer cities should be in the medium sizes range. Within the past twenty to thirty years the largest cities for which some approximation of overall extent can be provided, such as Chicago, Los Angeles or Tokyo, have reached areas in the range of 3,000 to 7,000 sq km. Greater New York is at or exceeds 10,000 sq km but that area only carries an overall density of about 10–15 p/ha (Sternlieb and Hughes 1988; Fletcher 1995:225), near the T-limit. These gross figures suffice to confront us with the risks we face and the choices we might make.

As yet only low-density, widely dispersed conurbations, such as New York, have approached or exceeded 10,000 sq km. Cities with higher average residential densities have not reached the predicted C-limit, though the largest, such as Tokyo, have been moving rapidly towards it. Globally therefore the perspective provided by a long time-span view suggests that we may have a window of opportunity before a large number of cities enter the zone of severe communication stress. Specific countries, like Australia, whose largest city, Sydney, covers 3,000–4,000 sq km may have some time to tackle the problem but little leeway to ignore it. Moving to higher overall residential densities while slowing areal expansion offers a route away from the low-density trap and the crisis of approaching the next C-limit. What should concern national governments is that if we wish to avoid or mitigate future problems we need to begin now. In Los Angeles the recent riots were spread over an area which, if laid on the map of most medium sized cities, covers almost the total extent of their contiguously built-up area. Already we can perceive that even the temporary collapse of municipal management may have fearful consequences.

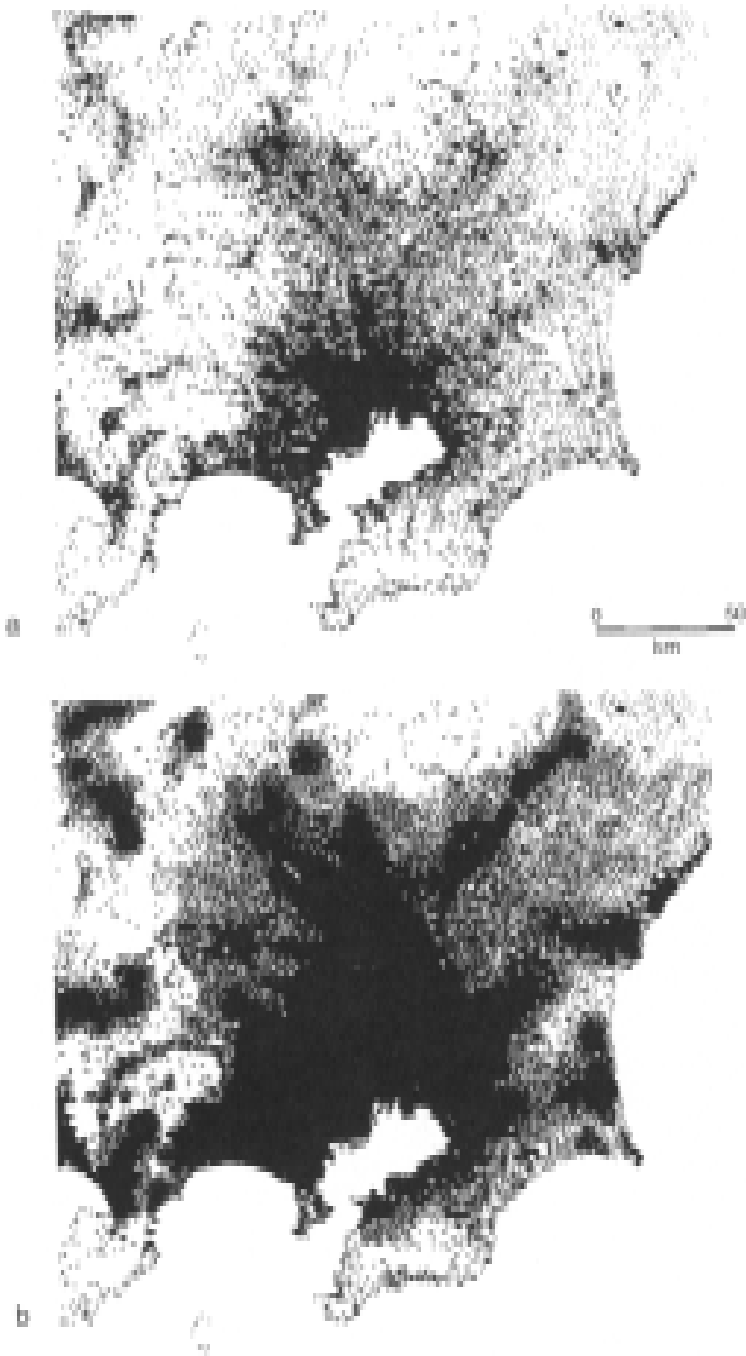
What might be required to control larger cities or what would happen if management fails, is the text of bleak science fiction.

The immediate, predictable future will be the continued growth of communities towards the proposed C-limit at or beyond 10,000 sq km. Our largest cities will become cumulatively more costly to *manage*. Up to now they have been relatively inexpensive because the communication stress levels have not been high. Until the 1940s, when the growth of industrial cities was still confined to the lower end of the size range, urban growth could occur at relatively low cost. Even so the consumption of resources by such settlements was prodigious and has increased very substantially in the past forty years. Communication stresses should now rise markedly as the biggest cities continue to expand in area. When they start to exceed 5,000–6,000 sq km the cost of sustaining their functions and growth should begin to increase exponentially. While we try to reduce waste and consumption, attempts to mitigate the pressures of urban life in very large cities will exert ever greater demands on the preferred allocation and consumption of resources. Just at the time when we have perceived the need to reduce consumption and waste our largest cities are moving toward circumstances in which stress might most easily be mitigated by profligate waste. ‘Convenience’ will be ever more necessary to compensate for the stresses of life in larger, faster, more intense and demanding cities.

One trajectory out of this bind is towards low-density extension, as has already happened in some of the great North American cities such as Los Angeles, Chicago-Gary, Detroit and Greater New York. It is increasingly common world wide. But while this trajectory could hold off a decline due to interaction stress and communication overload we may then be trapped into settlements with no potential to transform out of that dispersed mode. At sizes beyond 10,000 sq km the great dispersed conurbations will not be able to move back up to higher densities without major transformations in their systems of communication. Furthermore, the extent of previous, massive dispersed complexes like Chaco Canyon (Cordell 1984) and Angkor in the fourteenth century AD suggest that there is little to constrain the continuing extension of dispersed residential occupation. The implication is that in the absence of a communication constraint such settlements may be able to expand almost without friction. Vast interlinked scatters could result along the east coast of Australia, along the Pacific coast of Japan from Tokyo to Kobe, or from the East Coast megalopolis inland to the Chicago-Gary complex in the USA. If we move towards a future of such vast low-density, extensive urban residence (Doxiadis 1963:376–80, 430–60) we will be locked into a behavioural dead-end. Meanwhile the growth of the older, industrialized urban centres may begin to stagnate. The initial period of massive development has already led to a future in which communities are burdened with ever-increasing maintenance costs unless they drastically edit the older installations and constructions out of their cultural assemblage. The initial industrialized cities are burdened by old and very tough but deteriorating infrastructure. In order to cross the 100 sq km

C-limit, London and Paris were committed to a huge investment in buildings and mechanical systems such as railways. For the whole of the UK about 700–750 million bricks were used per annum in railway construction during the mid-1840s (Bagwell 1974:118; Barker and Savage 1974:79), approximately 33 per cent of the entire annual output of the brick industry. In London, Charing Cross station alone required 17 bridges, 190 brick arches, an iron viaduct and a hotel (Konvitz 1985:102). Future growth in these initial cities is severely burdened and a massive inertial drag may be starting to slow their heart. Would this be for the best or will governments attempt to overcome this additional burden by further commitment of capital?

The critical trajectory of the future will go towards giant high-density settlements which will halt behind the next C-limit to become stasis settlements covering 7,000–10,000 sq km—a future Tokyo covering the entire Kanto plain (Figure 7.8) and a Mexico City spilling out of the Basin of Mexico, reducing Teotihuacan, the great agrarian city of the first millennium AD, to the proportionate scale of a municipal park. The consumption of materials to sustain growth and facilitate the control of interaction is liable to markedly increase. The economic demands and control required to sustain such cities will be enormous since compact communities just behind the 10,000 sq km C-limit and close to the I-limit, will be able to contain over 100 million people and perhaps as many as 200 million. Even at quite ordinary residential densities for human beings of 50–100 p/ha, the largest cities could contain 50–100 million people. If new communication and interaction assemblages have not already been developed these cities will cease to expand but will still draw in resources to provide buffers against interaction and communication stress. The economic consequences of a process whereby the largest compact settlements in the world stabilize into a state of no-growth but vastly increased consumption warrant attention. The history of the Chinese imperial capitals (Rozman 1973; Skinner 1977) may provide some insight into the process. Most important, however, no amount of economic change on its own will aid growth beyond a C-limit. As is apparent from the archaeological record, only the combination of a new material assemblage to manage community life and a major economic transformation to sustain growth and feed the increasing population will allow the transition to another ‘take-off’ in the maximum settlement growth rate. It could be a thousand times more rapid than the nineteenth-century event. Would we want to trigger the immense growth rates of a new quantum leap in settlement size? The rate of urban growth in the industrial revolution would pale into insignificance. The past and the I-C model together warn of immense increases in rates of settlement growth if another transition occurs—a warning we can recognize only when the perspective of time allows us to see it.



**Figure 7.8** (a) Tokyo, Japan—1980s; (b) Tokyo, Japan—a future?

## CONCLUSIONS

Manoeuvring through the myriad interlinked problems of future urban growth will demand precise strategies based on skilful prediction. The I-C model allows the cross-comparison of rates and magnitudes of settlement growth at disparate size scales over the long-term record provided by the archaeology of the past 15,000 years. Past outcomes of growth can also be compared and made explicable within the perspective on time provided by the model. The predicted consequences of different settlement trajectories should therefore be of some use in understanding urban growth during the twenty-first century and trying to deal with its effects. To appraise the precise implications of the interaction-communication stress model, broad cross-cultural comparability over long spans of time and sophisticated area/density indices will be required for monitoring settlement growth trajectories. Attention needs to be directed not merely to population estimates but also to settlement area estimates and the degree of residential concentration as a behavioural phenomenon—not merely to population estimates—in order to identify what behavioural stresses are affecting a community. This initial analysis suggests that we may be able to test rigorously for the predicted occurrence of a C-limit at 10,000 sq km because of the effects it should have on growth trajectories and rates of increase at settlement sizes well behind a C-limit. We should also be able to identify more securely the threshold values below which behaviourally unconstrained settlement growth is able to occur. We now need to find out what rates and scale of growth the low-density trajectory permits and what stops low-density growth—one of the central concerns of urban planners in the late twentieth century. Perhaps Great Zimbabwe, Chaco Canyon, Maya Tikal and Khmer Angkor will have more significance for the industrialized world than we have envisaged.

## NOTES

- 1 At present the search for exactitude is probably a forlorn enterprise. Exact definition of settlement area is complex (Grytzell 1963; Linge 1965; Best and Rodgers 1973), and cross-culturally consistent definitions of settlement area cannot, as yet, be specified (see Fletcher 1986; cf. Gould and Yellen 1987; Whitelaw 1989). Estimates of settlement area are therefore inherently imprecise. That requires standard criteria for describing settlement size and growth rates across wide spans of time, if we are to make use of data from disparate regions to gain a perspective on our current predicament. At base a description equivalent to the material extent of an archaeological site is required, of the kind supplied by satellite photographs and the spectral characteristics of built-up areas. Likewise estimates of community size for many settlements will remain inherently vague and unreliable, until we devise new ways of precisely estimating the numbers of people in a settlement in the absence of detailed census records.

The problem in obtaining empirical evidence of residential densities for contemporary and recent communities is the uncertainty inherent in the definitions of occupant populace and settlement area. We therefore have to accept some degree of uncertainty and inconsistency if cross-cultural comparison is to be feasible (Fletcher



- 1986). Since we want to find out whether the comparative approach is informative or not, the preferable strategy is to inquire about large-scale patterns which do not require precise description. Once these have been identified and their significance has been evaluated we can then decide whether a commitment to precise, exactly repeatable measurement is worthwhile or necessary. We may find that tolerance of some error and uncertainty makes little difference to the results.
- 2 Only a finite amount of information can be handled by the human brain in a limited period of time (Halford *et al.* 1988).
  - 3 An interaction density limit will not be recognizable as a rigorously defined exact line. Rather it will constitute a zone beyond which examples are improbable. To take account of the coarse grade of detail which we can expect from inter-regional comparisons, and to allow for cross-comparison between disparate classes of settlement, I have adopted the policy of using gross settlement area estimates which encompass 'built' space and an extensive definition of the adjacent occupation space (Fletcher 1981, 1986).
  - 4 If the constraint was resource based then it would show up in the population figures and the line would be vertical not diagonal.
  - 5 The incremental change between the three abrupt increases in settlement size and the rates of growth associated with them are so large that empirical evidence for different values would have to be very considerable to seriously affect the proposed model. The case for the C-limits can be assessed throughout the entire archaeological record because they are recognizable from settlement and site area.
  - 6 At this and lower densities factors such as soil fertility, agricultural practices and crop distribution will be the dominant variables affecting regional densities.
  - 7 The nearest iconic equivalent would be a wide, sticky strip of increasing viscosity toward its leading edge. A precise statement of the indeterminacy of the limit zones will eventually be required. They possess this characteristic not because we lack data or knowledge but because the 'choices' which communities make as they approach a limit are not deterministically predictable.

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## 8 *The Hochdorf ‘princely’ grave and the question of the nature of archaeological funerary assemblages*

LAURENT OLIVIER

Traditional history, focused on short-term individuals and events, has made us accustomed to its precipitate, dramatic and breathless narrative. New economic and social history pushes to the forefront the research of cyclic periodicities and is attached to the study of their durations.... Thus, today, beside the story—or the narrative—of traditional history, there is now place for a narrative of situation, which studies the past through long sequences.... Way beyond this second level of narrative is to be found an even longer history, this time at a centenary scale: a history of long, even extremely long duration. These formulations are of little importance: it is between one and the other, from one extremity of time to the other, from the instantaneous moment to the long duration—on this our discussion will be focused.

(Braudel 1969:44–5)

### **INTRODUCTION: THE ‘PRINCELY’ GRAVES OF THE LATE HALLSTATT IN EUROPEAN ARCHAEOLOGY**

European iron age archaeology, as it is currently practised on the continent, remains dominated by an historicist approach. Moreover the study of archaeological material produced by protohistoric societies is undertaken to reconstruct cultural entities which identify specific periods, and to determine their spatial extension and chronological duration. This culture-historical tradition has, for the last century, been linked with the German archaeological school. Such an approach has its roots in the nationalist movements of the middle of the nineteenth century, together with the development of ‘national archaeologies’, the aim of which was to research the prehistoric cultural origins of contemporary national states.

From the time they were first discovered during the second half of the nineteenth century, early iron age wagon graves have attracted attention because of the richness of their grave goods. For the same reason these graves were attributed to a class of ‘Celtic princes’. Significantly, until the discovery

of the Hochdorf grave in the 1980s, most information about the ‘princely’ graves of the Early Iron Age was provided by the excavation of the ‘*Hohmichele*’ burial mound at Altheim–Heiligkreutztal (Kr. Biberach; Baden–Württemberg; Riek and Hundt 1962): this extensive excavation was one of the main projects of the *Ahnenerbe* Nazi programme, initiated by Himmler (Arnold 1990; McCann 1990).

Over the last thirty years the interpretation of the so-called ‘Celtic princely graves’ has changed, but their ideological dimensions continue to be important. In the 1940s, Late Hallstatt ‘Celtic princes’ have been described as the first ‘chiefs’ of a non-egalitarian and hierarchical society, supposedly the first racial or ethnic entity of Europe. During the last ten or fifteen years these ‘princely’ graves have also been regarded as evidence of a first unification of Europe, a conclusion which fits into the ideology of the contemporary European Economic Community (EEC). However, the postulates of the historicist approach are still in place, namely, that the ‘princely’ graves of the Early Iron Age continue to be seen simultaneously as evidence of the origins of a Celtic cultural identity and as a specific form of social organization of Celtic ethnicity.<sup>1</sup>

It is not my intention to retrace the epistemology of the streams of interpretations and paradigms which have shaped the present state of European iron age archaeology. Nevertheless, it is important to emphasize that the culture-historical approach to archaeological material is based on the fundamental notion, which runs throughout the history of the discipline, that the material remains of the past are to be seen as the direct expression of the identity of the *people* who produced them. From this perspective archaeological remains, cultural manifestations and linguistic entities of the past cannot be separated from one another, since they are one and the same thing: the unbreakable and unique expression of past ‘cultures’, and clear evidence of the origins of ethnic groups. This traditional understanding of archaeological remains is anti-evolutionary in nature. The culture-historical approach is opposed to those who believe that the identity of a system (or, in this case, of a ‘cultural entity’) does not exist in itself but, on the contrary, is defined by the interactions of this system with its environment.

The supremacy of this culture-historical tradition in Europe has important consequences for the definition of chronology. In this traditional approach, the measurement of time is based—by typo-chronology—on *the succession of stylistic features* which alone identify *the history* of the cultural entities explored by archaeology. Once again, this interpretation is opposed to the evolutionary tradition. The latter, relying on the study of structural patterns of archaeological phenomena, compares situations or contexts which may belong to different chronological moments or to different regions of space. From the historicist perspective, such an approach to archaeological data makes no sense. According to this tradition, there is no point in comparing typological assemblages from different periods or areas, for the very reason that they are defined precisely by their chronological and territorial specificity. This is one of the reasons why

traditional typo-chronology is essentially based on funerary assemblages, and on the central notion of the *closed find*.

The notion of the *closed find* holds that the items grouped together in each grave were placed there simultaneously, and consequently provide a synchronous picture of an instance in the history of the cultural entities studied by archaeology. According to this principle, it would be possible to rearrange these different closed finds in chronological order, by re-establishing the linear succession of their stylistic characters which would identify their history. This is the scope of the combinations of matrices or seriations used today, particularly in the German approach to archaeology.

Over the last ten years, the refinement of techniques of archaeological analysis has brought this cultural and chronological model to a crisis. While traditional typology was searching for cultural 'blocks', contemporary research, to the contrary, emphasizes the existence of a multiplicity of local features and stylistic or technological interrelations. This diversity of situations reveals that the conceptual constructions inherited from the culture-historical tradition become increasingly complex. In other words, the variability of archaeological contexts pushes these traditional systems to elaborate hypotheses which are more and more unlikely.

Furthermore, the stylistic chronology of these periods is also called into question by new methods of external or independent dating such as dendrochronology. Traditional typo-chronology is increasingly incapable of accurately defining archaeological sequences of even half or three-quarters of a century. The Late Hallstatt sequence, apparently well-dated due to the number of 'princely' graves associated with Mediterranean imports, is an excellent example of this problem. There is a dendrochronological gap of at least half a century between the chronological dates of the beginning of this period obtained from the '*Magdalenenberg*' tumulus at Villingen (Schwarzwald-Baar-Kreis; Baden-Württemberg; Spindler 1971, 1972, 1973, 1976; Stockli 1991), and the archaeological dating of the 'princely' assemblages belonging to the first stylistic sequence of the Late Hallstatt (Ha D1). This is an embarrassing problem, because the duration of Ha D1 is estimated at fifty years, according to typo-chronology. However dendrochronological dates place the beginning of this sequence towards the last quarter of the seventh century BC;<sup>2</sup> whereas stylistic dating suggests the middle of the sixth century BC. Other typo-chronological contexts, such as the Hochdorf assemblage, situate the end of this initial sequence of the Late Hallstatt towards the end of the sixth century. These margins of chronological uncertainty extend the dating of the Late Hallstatt stylistic sequence over almost the whole of the sixth century BC. This gap widens, according to the former chronological systems, from between around 600 BC to 500 BC.

What is the cause of these problems? For many archaeologists these difficulties are the direct result of a lack of solid data, which can only be resolved by further excavations to gather more suitable information. However, I do not believe that this is the solution to the problem. Using the example of the Hochdorf grave, I will demonstrate how detailed archaeological analysis using present-day scientific

techniques can reveal the developing complexity of archaeological data, while at the same time refining their objective description. To my mind the very nature of archaeological assemblages is yet to be explored. In this chapter I show that far from providing an unequivocal piece of evidence, the ‘princely’ grave at Hochdorf comprises different layers of information, amalgamating materials of different origins incorporated at different moments in time into the grave. I also show that the meaning of the funerary assemblage has itself dramatically changed over time.

## THE ORGANIZATION OF FUNERARY SPACE IN THE HOCHDORF GRAVE

### General characteristics

The Eberdingen-Hochdorf grave (Kr. Ludwigsburg; Baden-Württemberg) belongs to the category of the Late Hallstatt ‘princely’ graves. This series of burials are well-documented archaeological phenomena. There are approximately 100 wagon graves, archaeologically dated to the second half of the sixth century BC and discovered over all of the regions covered by the Hallstatt culture-area, but primarily grouped in eastern France, western Switzerland and south-western Germany (Pare 1992; Olivier 1995). These ‘privileged and princely’ graves represent less than 5 per cent of the funerary population buried in tumuli during the Late Hallstatt. The distribution of ‘princely’ wagon graves is concentrated over a radius of 10 kilometres around a dozen fortified hill settlements, in which were found imported Mediterranean pottery (or ‘Fürstensitze’; Kimmig 1969). Most scholars now believe that these sites functioned as direct intermediaries for Greco-Etruscan commerce, trading local raw materials for Mediterranean luxury products (Härke 1979; Wells 1980; Brun 1987).

We know a great deal about the design and structure of the ‘princely’ graves of the Early Iron Age. Burials are placed into wooden chambers which are covered with monumental burial-mounds of several thousands, even tens of thousands of cubic metres of soil. The corpse was usually buried accompanied by a ceremonial four-wheeled vehicle and metal drinking vessels, the latter almost always imported, or else locally made copies of Mediterranean types of vessels. Jewellery—frequently gold, weapons (usually a dagger), tools or items related to hunting and occasionally furniture—completed the funerary goods of these prestige graves. Differences in the richness of these funerary gifts, however, suggest that this stratum is not entirely homogeneous, but rather indicates some kind of internal hierarchy (Zürn 1974; Frankenstein and Rowlands 1978).

The discovery of the Hochdorf grave greatly enhanced research into, and knowledge of, these kinds of burials because of the excellent quality of the archaeological information it contained. The Hochdorf burial was exceptionally well preserved, and its wood, leather, material, bark and other organic matter were all in very good condition. The extremely rich grave

goods had escaped disturbance or robbery, and were as they had been since they were placed in the funerary chamber. Moreover, the excavation of the Hochdorf grave between 1978 and 1979 (Biel 1985) was undertaken to a very high standard, and was followed by a series of multi-disciplinary studies (Korber-Grohne and Kuster 1985; Korber-Grohne 1988). Thus the Hochdorf grave provides researchers with better quality and more diverse data sets, and more detailed levels of analysis, than any other extant Hallstattian 'princely' burial belonging to the last third of the sixth century BC.

### **The spatial structure of the funerary chamber**

Buried under a monumental tumulus the grave was set within a square beam chamber with a surface area of more than 20 square metres. The funerary chamber was schematically organized into a bipartite form (Figure 8.1). The western half contained the body of the deceased, resting on a large bronze bench, along with various other items associated with the body. The eastern half of the chamber contained a four-wheeled wagon, on which had been placed a series of different artefacts, mixing tools, pieces of horse equipment and bronze vessels.

The grave goods can be divided into three main categories on the basis of their spatial distribution, each category defined by association with the corpse.

#### *Corporal grave goods*

This first group of objects comprises items directly related to the corpse. Essentially these are the clothes and the jewellery of the deceased. These artefacts can, in turn, be subdivided into three main categories:

- 1 *Grave goods worn on the body* The corpse, laid out on its back, was clothed, bejewelled and armed. The deceased wore a cloth garment and a large conical hat, made of birch bark. On the feet were pointed, curled-back buskins covered with gold-leaf. The jewellery around the neck consisted of a necklace of amber beads and a tore of sheet-gold. There were two serpentiform gold fibulae on the chest. The right forearm bore a sheet-gold bracelet. A wide belt plaque with a sheet-gold decoration encircled the waist. A bronze dagger, completely covered in decorated gold-leaf, had been placed beside this belt.
- 2 *Grave goods in contact with the body* A small bag made of cloth and decorated leather had been placed on the chest of the deceased. The bag contained three large iron fish-hooks, with some fishing-line made of horse mane, a nail clipper, together with a toilet implement of indeterminate use. Near the head, in or on the hat, were two wooden combs and an iron razor, probably wrapped in cloth. The body seemed to have been laid out on some blankets which had been spread out over the bronze bench.



- 3 *Grave goods associated with the body* A quiver containing a set of fourteen arrows with iron heads, and one with a bronze head of a different type, had been placed over the upper left part of the body. A big sheet-iron drinking-horn had been hung on the south wall of the chamber, behind the head of the deceased, matching a set of eight other drinking-horns, of smaller size, all hung on the wall of the chamber. The iron drinking-horn appears to have been directly related to the body, while the others do not seem to belong to the personal equipment of the deceased. At the feet of the body a little drinking-cup made from sheet-gold was placed on a large bronze cauldron. Together, these probably comprised a personal set of drinking vessels,<sup>3</sup> even though the size of the cauldron—which can be filled with several hundred litres of beverage—indicates that the drink it contained was destined to be consumed by a very large number of people.

#### *Funerary-endowment grave goods*

This second category consists of items associated with the deceased in the grave, and occupied the second half of the chamber. A four-wheeled wagon with iron fittings was found in this half of the chamber. Various articles were deposited on its chassis: a maple yoke, pieces of richly decorated harnesses of two horses, a goad, a set of three bowls, nine bronze dishes and plates (either imported or imitations in the Mediterranean style), an axe, an iron knife, a branch of antlers, and an indeterminate object with an iron point. All of these artefacts associated with the metal vessels were placed on the bodywork of the wagon. The functions of some objects, such as the antler pieces and the pointed iron object, are uncertain.

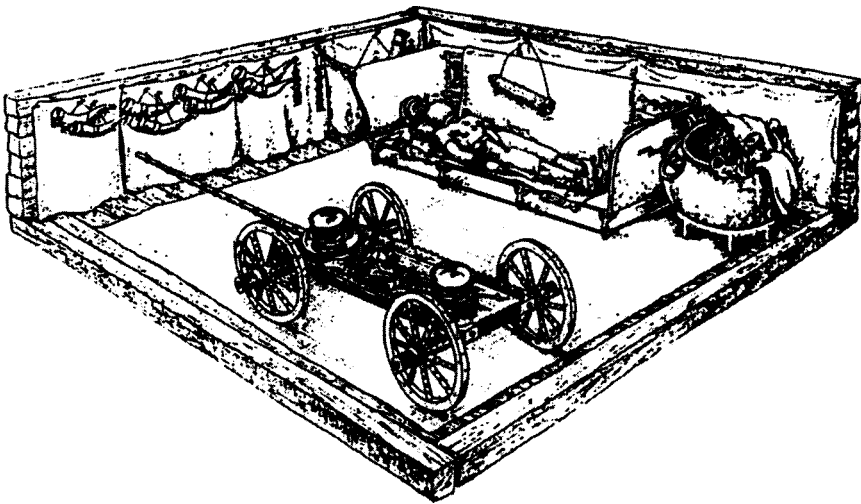
#### *Furniture and fittings in the grave*

The third and last group of objects consists of fixtures, fittings and furniture in the funerary chamber. Carpets and wall-hangings seemed to have covered the floor and the walls of the chamber. Against the west wall was a bronze bench or *Kliné* with anthropomorphic wheels, on which the body was laid out. This particular piece of furniture was decorated with scenes of dancing warriors with swords, and several four-wheeled, horse-drawn wagons, driven by a person brandishing a lance or a goad. The ensemble was covered with material: a badger-hair blanket and a mat made out of woven plant fibre served as a pillow for the head. The floor underneath the body seems to have been strewn with flowers and branches. Nine drinking-horns were attached to the south wall, behind the head of the body: eight of them were made out of aurochs horns, whereas the ninth, made of iron, and of which we have already spoken, was larger in volume, decorated with strips of gold and far more splendid than the others. Lastly, in the north-eastern corner of the chamber, placed near the feet of the body, a large

bronze cauldron of approximately 500 litres, rested on a wooden support. This vase had been three-quarters filled with the beverage hydromel. It was covered over with a cloth, on which was placed the small gold cup, mentioned earlier.

The items which were distributed in the previous spatial categories are generally related to three main kinds of activities. These can be divided into:

- body-care: indicated by toilet articles directly placed in contact with the body (wooden combs, iron toilet items); these objects were particularly connected with care of hands, beard and hair;
- hunting: represented by a series of weapons or instruments which were also placed in contact with the body (fishing tackle, quiver and sheaves of arrows); these were mainly related to the quest for big fish, and gamehunting with bow and arrows;
- exclusive consumption of beverages and food: indicated by objects which were either associated with the furnishing of the chamber, in the vicinity of the body (such as drinking-vessels), or else were situated in the part of the chamber where the rest of the accompanying grave goods were to be found, i.e. with the wagon (such as the bronze vessels). In both cases, the capacity (several hundred litres) and the number of these objects (8+1 drinking-horns; 9 plates and bowls) indicates that this consumption was associated with the sharing of food and drink.



**Figure 8.1** The display of grave goods in the Hochdorf chamber

### **Functions and distribution of the grave goods within the funerary chamber; the question of the Mediterranean ‘banquet’**

Artefacts used for body-care, hunting, and food and drink consumption are found in most of the early iron age ‘princely’ graves. For the majority of scholars the consumption and sharing of food and drink was related to the Mediterranean rite of the *symposium*, particularly since the drinking vessels placed in the graves are usually of Greco-Etruscan origin (Bouloumié 1988; Rolley 1992). The Hochdorf *Kliné* also appears to be part of Mediterranean banquet-culture which, through the medium of libations and food-offerings, united the worlds of the sacred and the profane. Thus, for Pauli, the identity of the person buried under the Hochdorf tumulus could be compared with that of archaic Mediterranean kings, who united political power and religious functions (Pauli 1989). On the other hand, the height and the evident corpulence of the Hochdorf ‘king or prince’ indicates that these iron age aristocrats benefited from a privileged diet, probably sustained over several generations, which could be an indirect indication of the hereditary or dynastic transmission of power.<sup>4</sup>

Within the assemblage of Hochdorf grave goods the practice of ‘the banquet’ is indicated by two distinct groups of objects occupying separate places in the funerary chamber. In the first group are articles designed for drinking (such as the set of eight plus one drinking-horns and the cauldron filled with several hundred litres of hydromel) which are placed at the head and the feet of the body. The second group comprises objects which were probably used for the consumption of meat (such as the nine bronze plates and bowls). These were found in the second part of the chamber along with the wagon. The axe and knife associated with these vessels, together with the indeterminate instruments, apparently belonged to this second group of objects. These were probably connected with the slaughtering of cattle (with the axe?), with cutting and sharing of the meat (with the knife), and finally with its consumption (with the set of plates).

In this sense the funerary space in which food and drink were shared is not homogeneous. The objects which recall Mediterranean banqueting practice are joined by objects associated with meat-eating, the latter being of purely local origin. In fact, the deposition of a dinner service, together with a large knife or dagger (or *Hiebmesser*) is distinctly characteristic of the male weapon graves from the beginning of the Early Iron Age, in the regions east of the Rhine, which include Baden-Württemberg (Olivier and Reinhard 1993; Olivier 1995).

### **The funerary chamber: an assemblage of discontinuous funerary dynamics?**

If we examine the origins of the spatial organization of the chamber, we find that different cultural features are represented.

The division of the funerary chamber into two (one part reserved for the body, and a second part reserved for the accompanying grave goods) was a local practice originating at the beginning of the Early Iron Age. This spatial division and the placement of a wagon in the grave, are characteristic of dominant male weapon graves of the eastern regions of the Rhine. However, the bodies in the graves of this period were usually cremated. In the Hochdorf grave, the bronze vessel service and the tools related to meat-cutting occupy the same part of the grave as the pottery services and the knives of the local grave cremations of the Early Hallstatt. In these latter graves the remains of the cremated body and accompanying grave goods (usually ceramic pieces) were divided between the two different halves of the funerary space. This bipartite distribution indicates a similarity of practices related to the consumption of funerary food. The material culture of these practices has changed from local pottery sets of the Early Hallstatt to 'princely' services of imported metal vessels of the Late Hallstatt.<sup>5</sup>

However, unlike the division of the funeral chamber, the spatial distribution of the grave goods in relation to the body does not originate in south-west Germany. The origins of the Hochdorf corporal spatial display are to be found in the western regions of the Rhine, centred around north-eastern France, where inhumation was the dominant funerary practice during the Early Hallstatt. The presence of a razor in the grave, the toilet implements put near the head, the single bracelet on one arm, and the placement of a metal drinking service (either at the feet or behind the head of the deceased) are distinguishing features of dominant male graves associated with weapons, in this western region during the Early Hallstatt. These western spatial and corporal practices were probably introduced into areas which had traditionally used cremation in the eastern regions of the Rhine, when inhumation also became the main funerary practice of the Hallstatt culture-area at the beginning of the Late Hallstatt (Zürn 1987:19–28; Biel 1987:206–8).

Finally, the disposition of the furniture in the funerary chamber reflects an innovation introduced into the 'princely' burials of the Late Hallstatt and which, until then, was not present in the Hallstatt culture-area. The series of banquet-related, mostly imported items among the grave furniture, and their spatial arrangement within the funerary chamber, duplicates the organization of funerary space within contemporary Mediterranean graves. We should therefore consider these types of grave goods and their distribution in the grave as imports, of foreign origin and recently introduced into the 'princely' graves culture, during the second half of the sixth century BC.

From this evidence, we conclude that the entire structure of the funerary space of the Hochdorf grave reveals cultural referents of diverse origin, bringing together different spatial and chronological scales. Three chronological scales can be distinguished schematically.

- 1 The first chronological scale relates to long-term funerary dynamics, which extend from the Early to Late Hallstatt, that is, a duration of several centuries, from the eighth to the sixth century BC. These dynamics

condition the structure and the global morphology of the grave, i.e. the construction of a monumental tumulus above a central grave containing a wooden funerary chamber divided into two different parts, and are spatially related to a large territory, which extends east to the Rhine from Baden-Württemberg to Bavaria.

- 2 The second chronological scale, of less than a century in duration, involves the disposal of the corpse in the grave and the arrangement of personal belongings on and around the body. As mentioned above, these features can be related to the extension of inhumation as the main funerary practice to the east of the Rhine at the beginning of the Late Hallstatt period. Such medium duration dynamics are spatially related to a regional territory which corresponds approximately to that of the Late Hallstatt 'princely' graves, between north-eastern France, western Switzerland and Baden-Württemberg.
- 3 The third chronological scale of very short duration is associated with the introduction of new models of social and/or funerary representations, which are of Mediterranean origin. These practices are related to specific territories, which were connected through a network on both sides of the Alps.

### THE FUNERARY ASSEMBLAGE: A SUPERIMPOSITION OF DIFFERENT MEANINGS?

At this point in the analysis the grave loses its unity and begins to appear as an assemblage of different cultural referents, related to different temporalities and spatial distributions. The grave goods which are linked with banqueting reveal much more than this. Within this group of objects the bronze cauldron is immediately recognizable as a Greek import, as a foreign element in contrast with the rest of the grave goods.<sup>6</sup> However, at Hochdorf the cauldron is treated differently than in a Greek context. In Greece such cauldrons are usually part of sanctuary goods, whereas in the Hochdorf grave this cauldron was a funerary offering and was probably made especially for a barbarian 'princely' customer. Moreover, the cauldron had been altered before being put in the grave. One of the lion figures decorating the rim of the cauldron was replaced by a local imitation in the naive style. Furthermore, the cauldron was not filled with wine, but with hydromel. Finally, the cauldron was not supported by a metal tripod as is the case in Greece, but by a wooden base, also of local manufacture. Thus the cauldron is an object taken out of its original context, an altered artefact, the primary meaning of which has been changed into that of a *hybrid* article, transformed from its usual function.

The *Kliné* displays a similar hybridization of information. This luxurious piece of furniture is adorned with purely 'Hallstattian' decorative themes, with the representation of four-wheeled wagons and the 'dance' of warriors with their swords. However, it also includes stylistic references to, and techniques of,

Mediterranean origin. For example, the dot and bossette decorations, or the pendant fastenings, are related to those decorative techniques frequently found in northern Italian bronze-work, particularly from around Este. Given all this evidence, it is difficult to speculate about the real use of this piece of furniture in a Hallstattian context: could it be some sort of divan in the Greco-Etruscan style? Could it be a sort of bench or throne, as found in Etruscan aristocratic contexts? Or, finally, could it be a bed, as it is used in the funerary chamber to support the body of the deceased?

The drinking-horns present more difficult problems of interpretation, because they are objects hitherto not found in the Hallstatt culture-area. They appear generally after the end of the sixth century BC, particularly in the aristocratic graves of Early La Tène, as at the *Klein Aspergle Tumulus* at Asperg (Kr. Ludwigsburg; Baden-Württemberg: Kimmig 1988). At Hochdorf these horns appear to come from eastern Europe, or else were locally made and influenced by eastern European practices or styles. Judging by their capacity, these drinking-horns, especially the large iron one placed behind the head of the deceased, do not appear to be connected to the consumption of the hydromel in the cauldron. The small golden cup was better adapted to this sort of beverage, and was indeed clearly associated with the cauldron. In this case one has to infer that the drinking-horns were probably for another drink not represented in the grave (possibly beer?).

Thus the practice of banqueting, to which the most important and spectacular part of the grave goods are connected, begins to lose its assumed archaeological unity. The importance of the grave goods is now seen to be as evidence of the combination or superimposition of a series of different meanings and of dissimilar cultural and temporal contexts. There are several discernible 'layers' of interpretation which succeed one another during the archaeological life of the artefacts. The Hochdorf objects had particular and different meanings during their manufacture, then their utilization, and finally during their placement in the grave. The foreign grave goods emphasize the fact that the content of contextual interpretations also varies according to the cultural or social milieu in which these objects are used. Different meanings are ascribed to the same Mediterranean artefacts according to whether they were used in a Greek or a Hallstattian context.<sup>7</sup> We must also recognize that the various objects which finally found their way into the grave did not all arrive there at the same time or same stage of use. Some may have experienced long periods of use in different cultural or social contexts, others may have directly belonged to the deceased, others may never have been used at all, being put in the grave shortly after their manufacture. In each case the level of access to the life history of each of the objects in the assemblage determines our understanding of the identity of the grave.

## THE ARCHAEOLOGICAL SEQUENCING OF THE CONSTITUTION OF THE ASSEMBLAGE OF GRAVE GOODS

### The internal chronology of the objects associated with the deceased

Analysis of technological characteristics of the grave goods record provides evidence of several archaeological sequences. The changes in morphology of the artefacts are evidence of the internal micro-chronology of the assemblage. Once again this periodization connects temporalities of various scales, the existence of which was already apparent in the spatial structure of the grave, and in the categories of artefacts dedicated to the dead person.

For example, the rich gold covering of the dagger was superimposed on a weapon which was originally bronze, and which had its own decoration. Similarly, the belt-plaque of sheet-gold was superimposed on an original model of stamped bronze. The gold sheets decorating the buskins, one of which was broken during lacing-up, were later additions. The bands of gold leaf on the drinking-horns, like the bronze handles which attach them to the walls of the chamber, are also additions. Lastly, the two golden fibulae on the chest of the deceased are unfinished because their feet are not fitted onto the bow. Consequently these cannot be fastened and the pins have been twisted outwards. Technological analyses demonstrate that all the gold objects, with the exception of the torc, came from one single workshop which used the same raw material and the same bridle for making the stamped decorations on the buskins, belt-plaque, bracelet, fibulae and drinking-horns. Kimmig believes that the golden cup from the drinking service could also have been specially made for the grave (Kimmig 1991). Also found in the tumulus were the remains of corresponding manufactured items which had been thrown into the sediment used to build the burial mound. This indicates that much of this manufacturing activity took place on the spot.

The sequencing of these transformations of the grave goods and artefacts allows us to differentiate three main chronological periods (Figure 8.2).

#### *Period 1*

The first group comprises artefacts which were probably personal possessions of the deceased. These are clothing and jewellery, such as the birch bark hat, clothes and buskins, gold torc and belt-plaque with its original sheet-bronze design; personal equipment, such as the dagger and its sheath, originally of decorated bronze; probably the quiver, fishing tackle, toilet implements; and possibly the tools which had been placed on the chassis of the wagon. Some of the artefacts had clearly been used for a long time before being put in the grave. These include the extremely well-worn anthropomorphic wheels of the *Kliné*, with missing

iron shaft; the cauldron with one of its original lion figures replaced by a local copy; the bronze vessel service which shows signs of many repairs; the hanging rings on the bowls were well worn, and their bottoms had been pierced many times. Evidence of numerous breakages on the dishes and plates, and of repair-work, also testifies to long usage of the table service before it was recycled as grave goods.

### *Period 2*

A second group of objects has either be modified or else incorporated into the assemblage during the period between death and the placing of the corpse in the grave. This is the period when the gold-coating of the shoes, dagger and drinking-horns must have taken place. This is probably also true for the manufacture of the golden fibulae, cup and bracelet. These transformations are focused on the personal items of the deceased.

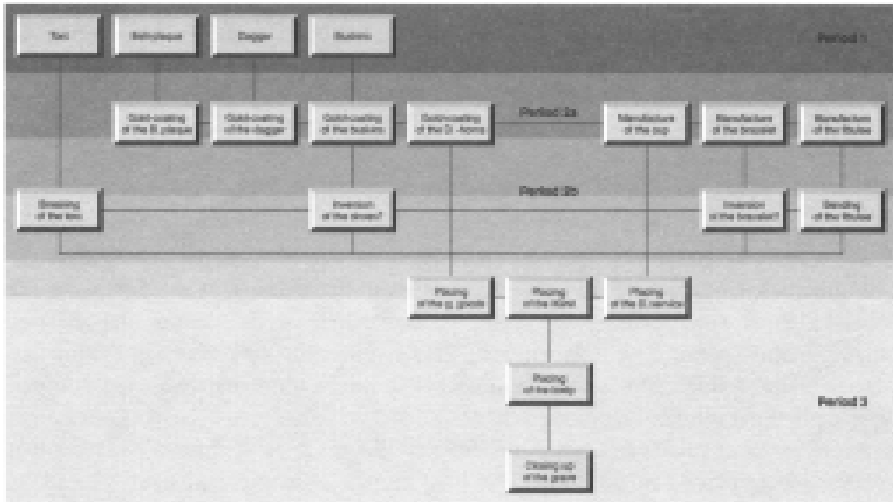
Another kind of manipulation of the assemblage apparently took place prior to their being placed in the grave: the buskins, for example, had been placed on the wrong feet.<sup>8</sup> The gold bracelet, which is usually worn on the left forearm in western Hallstatt male inhumation graves, seems to have been transferred to the right forearm. The gold torc had a break in it, possibly caused by passing it around the deceased's neck. Significantly the break had caused a fragment of the gold-sheet to become detached but this was not found in the grave, suggesting that the breakage of the torc had in fact occurred elsewhere. Finally, the arrows were found placed upside-down in the quiver, points upwards, in an apparently non-functional position. These projectiles appear to be a composite set, the shafts made out of five different woods. Whereas the isolated arrow with the bronze tip had a shaft made out of yet another wood.

### *Period 3*

A third group of objects was introduced or manipulated at the time of the installation of the grave goods into the burial chamber. It is significant that these are essentially articles which assigned social status. The wagon, for example, had to be taken apart in order to get it down into the chamber, and while its wheels had been put back onto the axles, its hub-caps were simply left on the chassis. Similarly, the bronze cauldron had certainly been carried into the burial chamber empty, and then filled with hundreds of litres of hydromel. It is probable that the articles associated with the wagon (such as the horse-harness) or with the drinking-horns or the bronze vessels, which seem not to have belonged to the deceased, may have been added to the grave goods when the deceased was placed in the funerary chamber.

This evidence shows that the selection of grave goods could have occurred over a long time with only instances of this process represented in the Hochdorf





**Figure 8.2** The sequence of archaeological transformations taken to create the Hochdorf assemblage

grave. For example, we lack complete information about the period between the death and the interment of the corpse. The stratigraphy of the tumulus shows that a period of several weeks elapsed between the beginning of the construction of the funerary chamber and its sealing-up after the complete installation of the grave. During this time, it would have been necessary to preserve and store the corpse elsewhere. The skeletal remains tell us nothing about this period and the funerary chamber must be seen as a secondary locus of deposition following a first, where the corpse was exhibited. The period preceding the interment was extremely important because during this time most of the operations involving the preparation of the body and the grave goods must have occurred. It is possible that this sequence, prior to the entrance of the body into the grave, was related to a series of practices for which there is no record in the funerary assemblage. These practices could have included, for instance, animal or possession sacrifice, and the sharing out of food and drink.

### **What happened to the identity of the deceased?**

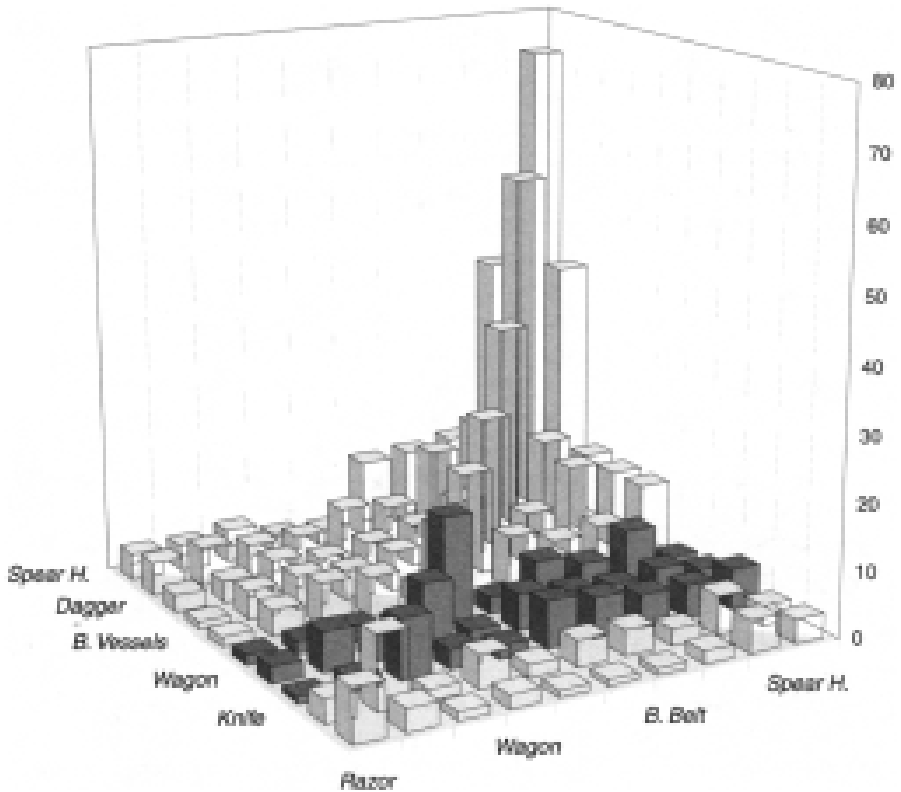
At this stage in the analysis the whole grave ensemble appears as a montage, a kind of funerary stage set for the arrival of the corpse. Indeed, most of the artefacts have been shown to be additions to what was originally, a fairly basic personal panoply. In fact the original personal equipment was similar to the constituents of the conventional male weapon graves of the Late Hallstatt found in south-western Germany. This original personal equipment or basic panoply

comprised a dagger in a bronze sheath, a belt-plaque in sheet-bronze, a sheaf of arrows, some toilet implements, an amber bead necklace and a sheet-gold torc.

In Baden-Württemberg, several male weapon grave assemblages with sheet-gold jewellery have been discovered as part of Late Hallstatt secondary inhumations. These assemblages are similar in content to the basic panoply of the Hochdorf grave. The burials are generally incorporated into a pre-existing tumulus, built for a primary grave of high status. An example of this is *Tumulus 1* at Herberdingen-Hundersingen *Talbau-Giesshübel*, near the 'princely residence' of the *Heuneburg* (Kr. Sigmaringen; Baden-Württemberg). Grave 1 contained a secondary wagon-inhumation with a dagger, iron lance-heads, a sheet-bronze belt-plaque, together with a sheet-gold torc (Schieck 1956:43–58; Pare 1992:251–2).<sup>9</sup> Grave 2 revealed a combination of artefacts similar to Hochdorf basic panoply, that is, a sheet-bronze belt-plaque, a dagger, a fibula and a glass bead, together with a torc and a bracelet in sheet-gold (Schieck 1956:35).<sup>10</sup> Grave 5, also a secondary grave, contained a sheet-bronze belt-plaque, an iron lance-head and a sheet-gold torc (Schieck 1956:28–9).<sup>11</sup> A comparable assemblage was found at the *Eichbuckel* tumulus at Dusslingen (Kr. Tübingen; Baden-Württemberg): in Grave 1, a male inhumation was associated with an iron lance-head, iron toilet articles, together with a torc made of sheet gold (Schieck 1956:17).<sup>12</sup>

The archaeological dating of the Hochdorf cauldron leads us to conclude that these different male weapon grave assemblages with their sheet-gold torcs belong to the same period as the Hochdorf grave—that of the end of the Late Hallstatt. They demonstrate that the male wagon and gold jewellery assemblages are not exclusively associated with 'princely' graves buried under monumental tumuli. Although the Late Hallstatt 'princely' graves enjoy luxury funerary donations, these do not form an isolated group from the rest of the male weapon graves in south-western Germany. Similar gold jewellery and archery equipment visibly circulate within different categories of Late Hallstatt funerary assemblages. In the *Magdalenenberg* tumulus at Villingen (Schwartzwald-Baar-Kreis; Baden-Württemberg), for example, a secondary male inhumation (Grave 90), with no gold jewellery, contains a dagger, bronze belt-plaque and, probably, a quiver containing seven arrows with iron heads.<sup>13</sup> Wagons are not necessarily associated with primary 'princely' graves. For example in eastern France and western Switzerland, the majority of wagon graves of the end of the sixth century BC mainly belong to secondary burials which followed on from a primary grave with a tumulus and date from the Early Hallstatt.<sup>14</sup>

The combination of grave goods in the Late Hallstatt weapon graves of Baden-Württemberg confirms this evidence.<sup>15</sup> The 'princely' wagon graves, with gold jewellery or bronze drinking services, cannot be separated from the other graves by a specific combination of exclusive items. They also cannot be dissociated from a wider group of male-grave-type assemblages, characterized by the predominance of a combination of lances, fibulae, dagger, belt-plaque and bronze vessels (Figure 8.3). It is noticeable that gold jewellery is not only associated with bronze vessels, but also with lances; whereas wagons appear with the assemblages in only half the cases.



**Figure 8.3** Late Hallstatt weapon graves in Baden-Württemberg: combination matrix of the different types of grave goods associated with the deceased

Taking all of this evidence into consideration we have to question the identity of the ‘prince’ buried at Hochdorf. Indeed, the sequencing of the observable manipulations of the objects indicates that the items identifying the privileged status of the deceased were added to a basic panoply which is not exclusive to ‘princely’ assemblages.

### **The funerary space: an assemblage of temporalities of different scales?**

Within the Hallstatt culture-area there are many comparative elements which confirm that the recruitment of grave goods from a fairly wide chronological period is not limited to the Hochdorf grave. Imported Mediterranean articles

placed in 'princely' graves often show signs of long use, evidenced by the disappearance of some of the original parts of the objects, or by repair work. In several cases some of the objects are obviously very old and one can assume that they had been inherited by the deceased. For example the central grave of the *Grafenbuhl* tumulus at Asperg (Kr. Ludwigsburg; Baden-Württemberg), probably created at the very end of the sixth or the beginning of the fifth century BC, contained luxury objects datable over two centuries. These include the handle of an ivory fan or mirror, made in the eastern Mediterranean in the seventh century BC (Zürn 1970:7–38). The grave goods of the *Grafenbuhl* tumulus also included two bronze lion's feet, probably part of a Greek tripod, and dated to the first half of the sixth century BC. This was found together with some remains of a *Kliné* dated to the second half of the sixth century BC (Fischer 1991). In the *Kleinaspergle* tumulus, also at Asperg, two Greek cups deposited in the secondary grave had been broken during their lifetime and the repairs were masked by gold leaf decoration. The manufacture of the cups can be dated to around 450 BC, whereas they were placed in the grave no earlier than the last third of the fifth century BC, that is to say at least twenty years later, towards 420–430 BC (Kimmig 1988:277).

With the exception of the Hochdorf grave, which is one of the rare cases of 'princely' grave excavations conducted using modern archaeological techniques and standards, evidence of the treatment of the corpse prior to placement in the grave is difficult to discern. Any conservation techniques used to preserve the Hochdorf corpse left no visible traces on the skeletal remains. In southern France Dedet has recently drawn the attention of archaeologists to the presence of inhumations in a secondary position in the tumulus graves of the Languedoc during the Early Iron Age. Recent studies among these numerous cases have demonstrated that the bodies had been preserved in a provisional grave for an indeterminate length of time prior to being taken to their final resting places (Dedet 1992:71–94).

It is difficult to identify evidence of the manipulation of funerary grave goods, and it is difficult to ascertain whether transformations took place before or during the incorporation of the objects into the grave. However, there are some examples related to the inversion of the objects, notably of weapons, in funerary contexts. For example, in the 'princely' wagon grave of the *Hohmichele* tumulus at Altheim-Heiligkreutztal (Kr. Biberach; Baden-Württemberg), the male inhumation is accompanied by a flat quiver containing a sheaf of fifty-two arrows, the heads facing upwards, as was the case in the Hochdorf grave (Grave 6; Riek and Hundt 1962:152). Mercer compares this non-functional position with the deposition of 'tribute arrows' in Mongolian graves, which relate to offerings of arrows in a master's grave (Mercer 1970:203). Other more thoroughly documented cases of inverted grave goods are found in the sword inhumations of the Early Hallstatt. In these male graves swords were often inverted on the body, the point towards the head and the hilt towards the feet (Gerdsen 1986:83). This practice is rare in the inhumation region of north-eastern France and Saarland,<sup>16</sup>

but it is frequent among the local inhumation groups in the South of France, where it was usually associated with weapon breaking.<sup>17</sup>

The presence of arrows of different types together in the same quiver may also be the result of the manipulation of the objects before their incorporation into the funerary assemblage. The light iron arrow-heads of Hochdorf and the *Hohmichele* tumulus, adapted for precise shooting over long distances, were probably designed for hunting (Biel 1985:64–5). The perforating bronze point found at Hochdorf, in the shape of a miniature lance-head, is another type which may have been designed for war. A similar point, also included in a set of hunting arrows, has been found in Grave 2 of *Tumulus A* at Ewattingen (Kr. Waldshut; Baden-Württemberg). This arrow-head had been turned the opposite direction to all the other arrows in the quiver (Sangmeister 1992). These examples show that the arrows were indeed modified during the period between their use as weapons and their deposition as grave goods, and these manipulations seem to have occurred when the grave goods were being collected prior to their incorporation into the grave.

There are many examples of the manipulation of objects at the moment they were placed in the grave, particularly in the case of male high-ranking graves. The wagon, for example, which may have been dismantled to allow it to be installed in the funerary chamber, may have been wrapped in material, as was the case with the central grave of the *Tumulus de la Motte des Fées* at Apremont (Haute-Saône; Perron 1880). Masurel demonstrated that no less than 150–200 different kinds of material, often placed one on top of the other in layers, had covered the vehicle (Masurel 1984). The wheels of the wagon in the *Tumulus de la Butte* at Sainte-Colombe (Côte d'Or) were also wrapped in material (Flouest 1887). At Apremont and in the grave of the *Sous le Chemin de Naviot* tumulus at Marainville-sur-Madon (Vosges), it appears that pieces of leather were also part of the covers of wagons in the funerary chamber (Mohen *et al.* 1987:94, fig. 118; Bargain *et al.* 1993:77 and fig. 10). The practices of packing with, or the covering of, parts of Late Hallstatt wagons, are similar to wrapping practices found in Early Hallstatt high-ranking male graves. Recent investigations of the inhumation regions to the west of the Rhine have shown that little strips of material, often cut from different clothes, were used to wrap unsheathed sword blades. This was particularly the case in weapon graves excavated in the *Devant Giblot* tumulus cemetery at Diarville (Meurthe-et-Moselle; Olivier 1991).

## THE INTERPRETATION OF THE HOCHDORF GRAVE AND THE QUESTION OF ARCHAEOLOGICAL TEMPORALITIES

### **The chronology of the collection of the funerary assemblage**

The selections of objects comprising the funerary assemblage are not single episodes in time. As we have just seen there is a number or series of different

periods in this process, which occurred between the life-time of the objects and their final placement in the grave. These periods are:

- Period 1 objects belonging to the deceased during his life-time, including, sometimes, objects which did not originally belong to the deceased, which were inherited or passed on, but from one or several earlier periods;
- Period 2 objects introduced, transformed or manipulated between the death of the corpse and the installation of the corpse and grave goods into the grave;
- Period 3 objects introduced, transformed or manipulated at the moment of the setting up of the grave.

The existence of different periods in the gathering of the funerary assemblage directly affects chronological estimations determined from typological studies of the grave goods. In this sense the funerary space can no longer be considered as an absolutely closed context. The multi-temporal nature of the funerary assemblage also affects the meanings of the objects placed around the deceased. If the selection of these objects is connected to different moments in a process which begins during the life of the deceased, and is prolonged until after his death, then the grave goods do not have just a single, unique, significance in their relationship with the deceased. The role assigned to the objects changes from the time when they were possessed or used, to the moment during which they are consigned to the grave. These transformations are manifest in the manipulations or modifications to the grave goods after the death of their owner.

Such a stratification of meanings developed throughout the archaeological life of the object, can be identified when the development of new significances or interpretations are accompanied by physical modifications to the artefacts, that is, evidence of adaptation into new forms or methods of utilization. Modification does not necessarily stop at the moment of the burial or abandonment of an object. The chemical stabilization and restoration of the Hochdorf grave goods constitutes the final episode in the life of these objects, testimony to their reinterpretation as archaeological remains or museum exhibits.

Finally, this sequence of transformations, reflecting the changing recognition of the status of the deceased, are only indirectly or partially recorded in the archaeological assemblage. If we wish to define the identity or the social position of the deceased (Binford 1972; Tainter 1978), we must consider, and consider just as seriously as the contents of the grave, all of the archaeological features associated with the grave. It is necessary to examine the entire process of the history of the funerary assemblage, from its beginning to its end.

## **The chronology of the construction of the funerary monument and the maintenance of the memory of the deceased**

The stratigraphy of the Hochdorf tumulus reveals the complex history of the construction of the monument. It is estimated that the burial mound took five years to construct, according to evidence provided by fragments of wood found in the tumulus. An access corridor to the central grave was built first, then closed up. Finally a succession of several demarcation structures for the funerary monument were installed. This series of modifications accompanied the installation of the central grave, the closing up of the funerary chamber, and finally the incorporation of the grave into a burial mound. Three main phases can be distinguished, and are marked by successive stages in the tumulus.

### *Stage 1*

During a first phase, oak trees destined for the construction of the funerary chamber were chopped down, brought to the site of the central grave and the beams squared off. Next, a large central pit 11 metres square and 2 metres deep was dug, and the earth from the excavation spread in a ring around it. Two wooden chambers, assembled by the *Blockbau* technique, were fitted into the pit, joined to each another, but separated by a block filling. A primary tumulus, consisting of mounds of turf was then built around the back-dirt of the central pit. This burial mound reached up to 40 metres in diameter, with a height of approximately 1.5 metres. A dry-stone facade was built on the north side of the periphery of the burial mound, extending either side of a 6 metre wide entrance and bordered by two inner walls, heading towards the centre of the tumulus. The corpse was probably brought into the funerary chamber by this corridor.

Plant remains found at the bottom of the central ditch, and on the surface of the mounds of earth around it, confirm that these operations took place over at least one month. During this time the funerary chamber was probably left open and vegetation started to grow. This early state of the tumulus, when the corpse had to be preserved and kept in another place, is probably synchronous with Period 2, as identified by the grave goods. This chronological relationship is confirmed by the presence, within the stratigraphic layers related to Stage 1 of the tumulus, of bronze scoria and the remains of the manufacture of artefacts made out of gold and amber. These remains relate to the manufacture (during Period 2) of parts of the funerary equipment of the deceased.

### *Stage 2*

The placing of the body in the grave and the closing up of the chamber were probably accompanied by the deliberate obstruction of the access corridor, which was blocked from then on and at both ends by a dry-stone wall. A further

load of sediment, several metres in height, piled onto the burial mound of Stage 1, constituted the mass of the final tumulus. The base of the funerary monument was then cordoned off by a made-up stone circle and reinforced with a beam structure. The incorporation of vertical oak beams and diagonal stakes into the circle of masonry was probably intended to strengthen the construction to resist the force of the huge accumulation of earth on the top of the tumulus.

### *Stage 3*

Several secondary graves were discovered in the mass of the burial mound, and belong to another sequence of reoccupation of the funerary monument. Some pieces of jewellery in bronze and glass, found in the eroded levels of the mass of the Stage 2 tumulus, have certainly come from superficial graves, installed there after the construction of the burial mound, and dismantled by later erosion.

A preserved male inhumation grave on the northern edge of tumulus, was installed over the entrance area of Stage 1 (Grave 2).<sup>18</sup> However, two other graves had been installed during the actual construction of the tumulus. This is the case with Grave 3, situated to the south-west of the funerary chamber and, from all evidence, placed there before the end of the erection of the Stage 2 tumulus.<sup>19</sup> The other grave (Grave 4), on the southern edge of the burial mound, is directly sealed up by the stone circle of the second stage of the tumulus. It contained an inhumation which was probably male,<sup>20</sup> associated with the cremation of a second person. This secondary burial, placed in a ceramic vase, was deposited near the skull of the original occupant. This type of bi-ritual burial, combining a secondary cremation and a main inhumation together in the same funerary deposit, is thought to be an expression of dominance and dependence (Olivier and Wirtz 1993:167–8; Olivier in press).

This group of secondary graves, placed directly in the burial mound constructed for the person buried in the central funerary chamber, indicates the existence of a relationship between the primary grave and the series of secondary burials. According to their stratigraphic context these graves seem to be the expression of two different types of relationships with the primary central grave. A first group of secondary graves (such as Graves 3 and 4) are probably burials of dependent persons, whose remains were incorporated into the funerary monument at the beginning of its construction (Stage 1). These graves themselves reflect some sort of internal hierarchy, demonstrated for example by the funerary assemblage of Grave 4. A second group, to which Grave 2 belongs, comprises later burials dug into the tumulus after its construction. These graves probably express a different relationship with the primary grave, one which seems to be based on identification, rather than direct lineage.

### **The temporalities of 'archaeological duration'**

The Hochdorf grave can be seen as a scaled series of different archaeological temporalities, stretching from the life of the deceased, through the various



modifications of his grave goods, to the reoccupation of his funerary monument. These series are not continuous, since all of the diverse episodes were not recorded in the archaeological context, unless they occasioned physical modifications of the archaeological material. In this sense, we have only partial indications of the important sequence that Period 2 comprises, the period during which the corpse was exhibited and fitted out before being transported to the grave. Equally, we have scant information on Stage 1 of the tumulus, during which the funerary chamber was installed and a series of ‘ancillary’ graves were placed in connection with the central grave.

It is important to note that the archaeological funerary assemblage has retained the imprint of these different archaeological events, which took place between the death of the man buried under the Hochdorf tumulus and the end of the occupation of his funerary monument. However, these events themselves preserve, in their very structure, the memory of anterior temporalities. This pattern can be defined as an archaeological form of the historical concept of ‘duration’, as defined by Braudel (1949).<sup>21</sup> Within the multi-age dynamic which conditions the identity of the funerary assemblage, several temporal cycles of different magnitude and nature are superimposed on one another.

As we have seen most of the traits which characterize the stratum of ‘princely’ graves in the second half of the sixth century BC have their roots in the horizon of the sword graves of the Early Hallstatt. At Hochdorf we have clear evidence of an extension of key funerary behaviours, which belonged to the high-ranking male graves of Early Hallstatt, into the regions situated to the east of the Rhine. Other practices, originating to the west of the Rhine, were also connected to that same period of the beginning of the Early Iron Age. However they bear evidence of recent influences rather than of a long evolution on the same spot. This is the case, in particular, with the positioning of the objects in relation to the buried body, together with the inversion of certain personal items in the grave goods.

Some of these procedures found at the beginning of the Early Iron Age and developed with the expansion of the ‘princely’ wagon graves in the Late Hallstatt, were probably marked by a progressive change of meaning over time. This is the case particularly with the practice of substitution deposits, where articles connected with animals or people not represented in the grave are put into the grave instead of these animals or people themselves. During the Early Hallstatt high-ranking male graves are, for example, associated with horse-trappings or harness, while the animals to which this equipment belonged are not buried. The placing of a wagon in the grave is related to similar practices, and is frequently connected with the deposit of horse-trappings and yokes. The wagon itself may only be represented in the grave by parts of the vehicle, such as the linchpins. These practices are clearly linked to the early Hallstatt province situated to the east of the Rhine. However, as Pare emphasizes, the partial deposit of wagons is also found in the Italic domain, notably in Etruria (Pare 1992:193). In the Hochdorf grave substitution deposit was signified by the yoke and the pieces of harness of the two horses which pulled the wagon. This type of deposit is also characterized by the sets of drinking-horns and bronze vessels, both of which

make reference to an assembly of eight guests who remained outside the funerary space.

Other features, the origins of which are found in the regions to the west of the Rhine, do more than reproduce, in a more or less altered form, former practices attached to the Early Hallstatt sword graves. These practices develop and prolong tendencies which started at the beginning of the Early Iron Age. For example, the connection between high-ranking weapon graves with dominant-volume tumuli clearly correspond to practices which developed with the expansion of inhumations in eastern France from the end of the Late Bronze Age (or *Ha B3*) to the beginning of the Early La Tène period. The expenditure of collective energy represented by the construction of these privileged burial mounds increases during the course of the Early Hallstatt, to explode in the sixth century BC with the 'princely' tumuli (Olivier and Wirtz 1993). A parallel development can be observed in the deposit into these high-ranking graves of vessels filled with beverage. Once again we are dealing with a practice which develops from the end of the Late Bronze Age in connection with the expansion of tumuli inhumations associated with weapons. In this case, the deceased is buried with metal vessels which include a receptacle destined to contain drink (usually of a capacity far greater than that of individual consumption) and in which, or on which, is placed a ladle or a little drinking cup. These articles obviously bear testimony to the role of sharing out drink to be consumed by a selected assembly of guests.

As with the volumes of the tumuli, the capacity of the vases increases exponentially during the course of the Late Hallstatt—beginning with several litres during the Late Bronze Age or at the beginning of the Early Iron Age, to several hundreds of litres during the sixth century BC, or even, in the case of the Vix crater, to more than 1,000 litres. At the same time the number of objects connected with the serving of wine placed in the grave also increases. The whole spectrum of cups, basins, *oenochoi*, and *stamnoi*, are to be found with the cauldrons or craters from then on. The increasing diversity of these articles indicates the development of a body of staff in charge of the 'banquet' service, proof that we are indeed dealing with (as well as the increase in tumuli volumes) an increase in the expenditure of collective energy absorbed by the expansion of the elites of the Late Hallstatt.

So, the 'princely' graves of the end of the sixth century BC constitute the apogee of a movement which started with the transition to the Iron Age, and they cannot be artificially isolated from the global dynamic to which they belong. These privileged graves are part of a long-term dynamic, which began towards the end of the ninth century BC, and which may be identified as a process of the 'concentration of power' (Olivier 1988:290–8; Pare 1993:98), ending with the super-hierarchical forms of the 'princely' society of the Late Hallstatt. This process of complexification of internal hierarchies seems to have been dramatically extended as it came into contact with Mediterranean trade. As Dietler mentions, exchanges with Mediterranean societies could have introduced a surge in the importance of certain local powers, such as the development of a

form of competition, which brought to a crisis the economic network and the traditional hierarchical structure of European early iron age society (Dietler 1990:387–8; 1992:408).

The existence of such archaeological dynamics leads us to consider funerary contexts in a different light. Archaeological funerary assemblages are the result of a variety of interactions which occurred in diverse scales of time and space, between a local milieu and the cultural, economic or social environment in which it participated. These relationships are characterized by fundamental instability, dependent on the sensitivity of such a system to the multiplicity of conditions which confronted it. The spatial scale of these conditions extends from purely local situations, the community of the Hochdorf person for instance, to global relationships which are expressed by exchanges with Mediterranean peoples. The temporal scale varies from immediate events, such as the life of an individual, expressed by personal objects in the grave, to ‘heavy’ trends developed over the course of several centuries, which are related to the maintenance of specific funerary practices.

### **PERSPECTIVES: THE NATURE OF ARCHAEOLOGICAL FUNERARY ASSEMBLAGES**

This analysis of the Hochdorf grave demonstrates that a single image of the funerary context masks the complexity of the diverse archaeological dynamics which interact in the funerary assemblage. Neither the structure of the grave nor the grave goods reveal a single unequivocal meaning. On the contrary, the funerary assemblage should be interpreted as the result of the stratification of information connected with territories and temporalities of diverse scales. There are at least three cycles or periodicities during which the status of the objects gathered in the funerary assemblage have been transformed:

- the life cycle of the objects deposited in the grave, extending from manufacture, to utilization and finally to burial with the deceased;
- the cycle of recognition of the status of the deceased, extending from the period following death to burial;
- the cycle of relationship with the dead person, extending from the erection of the funerary monument to later re-occupations or rearrangements.

These cycles comprise durations of different scales: from a few days to a few weeks for the cycle of recognition of the status of the deceased, from a few years to a few decades for the life of the artefacts and, finally, from some generations to centuries for the cycle of relationship with the dead person. Within this series we should also include the temporal scale involved in the archaeological interpretation, operating here over several millennia. Under these conditions the analysis of funerary material has to be envisaged as the connection of patterns observed within these different spatial and temporal scales, to reveal the dynamics

lying beneath the surface of events and practices. This is the very meaning of the structural approach of the French *Nouvelle Histoire*, developed by Braudel and the *Annales* School.

## CONCLUSIONS

Archaeological funerary assemblages can thus no longer be considered to be direct evidence of an unchanged past. This is a significant departure from the traditions of the archaeological analysis of burials. The historicist tradition of the 'principle of cultural identity' presupposes a natural link between the archaeological material remains and the cultural identity of the past, and masks an essential gap—the gap between archaeological remains, such as they come down to us, and the elapsed past from whence they come. Moreover, this traditional approach ignores the fundamental nature of archaeological assemblages, which are *multitemporal*, *polythetic* and *dynamic*. It is unlikely that there ever was one single culture, one single ethnicity, one single archaeological entity, but since Hochdorf times at least, the evidence clearly indicates that we have lived in multi-cultural and multi-ethnic societies.

Funerary assemblages constitute fundamental historic data, in that they have physically recorded dynamic and structural information from the past. It is possible to decipher this information and this is basically the business of archaeology. Thus archaeological data have undergone what we may define as a process of fossilization and what we are confronted with is indeed the preservation of certain parts of fossil patterns and dynamics, which we find compressed into a single level of observation within archaeological assemblages. To use a metaphor, we have yet to construct the palaeontology of this archaeological information, that is, to detail methods which allow us to recognize the evidence of structures and dynamics within the noise in which they are concealed, and to realize their respective positions in time. With this perspective, information recorded in archaeological assemblages gives us the opportunity to explore multiple dynamics which, on different scales of space and time, continue to connect the past with the present.

## ACKNOWLEDGEMENTS

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archaeology and mathematics. Finally, I warmly thank Susan Bridekirk for editing the translated text from its original français version.

## NOTES

- 1 For example, for Zürn (1974), the appearance of the ‘princely residences’ of the Late Hallstatt foreshadows the territorial organization of the Celtic tribes, as it is known at the time of the Roman conquest.
- 2 The central primary grave of the *Magdalenenberg* tumulus is dendrochronologically dated at 622 BC.
- 3 The drinking-horn, with a capacity of 5.5 litres, is made of assembled iron shells, and is distinguishable from the eight other horns, which are smaller and made of organic material. The drinking-cup belongs to a group of objects in sheet-gold which are specific to the finery of the deceased—the torc, bracelet, belt-plaque and shoes.
- 4 The Hochdorf deceased was approximately 40 years old, of athletic build and 1.87 metres in height. The bone remains of the ‘princely’ male inhumations of Late Hallstatt also comprise strongly built individuals with a taller than average stature for the Early Iron Age: 1.84 metres at the *Klein Aspergle* tumulus at Asperg (Baden-Württemberg), 1.83 metres at the *Grafenbühl* tumulus at Asperg (Baden-Württemberg), or 1.80 metres at the *Tumulus de la Butte* at Sainte-Colombesur-Seine (Côte d’Or). The body in the wagon grave at Marainville-sur-Madon *Sous le Chemin de Naviot* (Vosges), dated at the end of Early Hallstatt, had a stature of approximately 1.77–9 metres.
- 5 The structure and construction techniques of the tumulus, with its central chamber of wooden beams, assembled using the *Blockbau* technique, are also characteristic of this eastern cremation-area during the beginning of the Early Iron Age.
- 6 Rolley believes that the cauldron came from the same workshop which a few years later produced the *Vix krater* (Hydries workshop at Paestum and Sala Consilina; Rolley 1992). The lead used to fill the hollow cast lion number 1 probably came from the Laurion mines in Attica. The bronze with a high level of bismuth used for the original figurines of the cauldron appears to be related to outcrops of copper of Greek origin (Hartmann 1987).
- 7 Dieder emphasizes this with regard to Mediterranean imports originally connected with the consumption of wine, which may have been used in the Hallstatt culture-area without being associated with Mediterranean drinking practices, or which may have been used for local practices of consumption of other beverages (Dieder 1990:282–3, 1992:406, note 4).
- 8 Veit links the practice of inversion of grave goods with the symbolism of the ‘*mundus inversus*’ representing the passage from the living world to the world of the dead, in which, according to several anthropological studies, the left represents the side of the dead, and the right, the side of the living (Veit 1988).
- 9 Horse-trappings and bronze vessels were also associated with the grave goods.
- 10 A bronze bowl completes the grave goods assemblage. This context is attributable to the end of Late Hallstatt (or *Ha D3*).
- 11 The grave goods also included a bronze bowl. This context is probably attributable to the end of Late Hallstatt (*Ha D3*).
- 12 A bronze bowl, together with small articles made of iron and bronze (rings and hooks) complete the grave goods. This context is attributable to the stylistic sequence *Ha D2*.
- 13 The grave can be attributed to the stylistic sequence *Ha D1* (Spindler 1976:124–5).

- 14 As it is the case, for example, with the wagon graves of *Tumulus 7* at Diarville *Devant Giblot* (Meurthe-et-Moselle; Olivier 1991).
- 15 The data used (assemblages of the *Magdalenberg* tumulus at Villingen, and from Schwaben and north Württemberg) come from Sievers (1982:62–107, and Figures 5, 7–11, 13).
- 16 Four cases only are known in this area: Diarville *Devant Giblot*, *Tumulus 2* (Meurthe-et-Moselle; Olivier 1991); Minot *Les Crais de Vauchebaux*, *Tumulus 1* (Côte d'Or; Gerdson 1986:159–160, no. 244e); *Tumulus de Chaume* at La Rochepot (Côte d'Or; 1986:164, no. 263); and, lastly, *Tumulus 7* in the Rubenheim *Schornwald* cemetery (Saarland; 1986:135, no. 137c).
- 17 As it is the case at Cazevieille, *Tumulus B4* and *I4* (Hérault; Gerdson 1986:148, no. 197b–c), Esclanède *Tumulus de la Roche Rousse* (Lozère; 1986:154, no. 221), Floyrac, *Tumulus 3* (1938) (Aveyron; 1986:154, no. 222), Ispagnac, *Tumulus 12* (Lozère; 1986:155, no. 226b), Noailles *Tumulus de la Route Vieille* (Corrèze; 1986:161, no. 250) and Viala-du-Pas-de-Jaux *Tumulus des Fournalades* (Aveyron; 1986:166, no. 277).
- 18 It is an inhumation of a young man, accompanied by two lance-heads, a bronze torc and two drum-fibulae.
- 19 The grave contained the inhumation of a man, accompanied by two serpentiform fibulae and a razor.
- 20 The grave goods included two serpentiform fibulae, bronze belt-plaque and small iron knife.
- 21 On the applications of the approach of the *Annales* School to archaeology, see Bintliff (1991) and Knapp (1992).

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## 9 *The times of history: archaeology, narrative and non-linear causality*

JAMES MCGLADE

Time is invention or it is nothing at all. (Henri Bergson, *L'Evolution Créatrice*)

### INTRODUCTION

For the last decade or so, archaeology in company with other social science disciplines has been involved in a great deal of soul searching variously described as irrelevant, pretentious, a postmodern fashion or the most important revolution in the discipline for a hundred years. Whatever the truth or relevance of these comments, it is clear that much of the discourse surrounding archaeology in recent years has been engaged in a self-conscious examination of the processes and assumptions underlying its status both as an object of ontological inquiry and as a historical discipline. This has resulted in a scrutiny of the variety of methodological and theoretical platforms within which the discipline of archaeology operates. This period of self-reflection—or ‘navel gazing’ depending on which side of the rhetorical boundary we are placed—has been marked by a continuing polemic on both the true nature and possible recovery of archaeological knowledge.

Enshrined as a prominent aspect of the postprocessual agenda, it is essentially an academic discourse, owing much to the rediscovery of critical theory, and especially the work of Adorno and others of the Frankfurt School in their critique of the practice and ideology of western science. From this inspiration, there have emerged a number of attempts to construct a post-positivist methodology for archaeology (e.g. Hodder 1986; Barrett 1987; Shanks and Tilley 1987; Thomas 1991, 1993; Bender 1993; Tilley 1993). Factionalism, elitism and a search for the moral high ground have characterized these debates, which have been conducted with something of a pseudo-religious fervour in an attempt to establish the epistemological superiority of one mode of knowing over another. What is at stake here is the status and authority of the constructions and interpretations we place on archaeological material, i.e. the kind of ‘past’ we wish to construct, and for whom. Significantly, despite the

force and persuasiveness of these arguments—indeed this platform is now firmly entrenched as part of a normative position—they have had little impact on the routine practice of archaeology i.e. as an empirical, field-oriented discipline.

The relationship between theory and practice which underpins such debates, however, can only be understood within the larger compass of contemporary critical theory. Archaeology is set within a larger social science discourse whose main preoccupation has been a search for productive pathways through the labyrinth of approaches which we increasingly identify with the postmodern condition. One prominent consequence of this ongoing ‘post-mortem of the modern’ has been a critical examination of historiography, along with methods of historical reconstruction, and, specifically, a concern for the means by which we are to understand the processes which structure social, political and economic change.

What this amounts to is a crisis of confidence, and subsequent denial of history as we have come to know it, or at least of the increasingly problematic status of meta-narratives, of the grand sweeping models of civilization. This crisis is replete with questionable pronouncements on the ‘end of history’ (Fukuyama 1992). Such debates are not restricted to historiography, of course, but have come to dominate postmodernist discourse in the social sciences generally and thence, latterly, archaeology (e.g. White 1971; Shanks and Tilley 1987; Jameson 1991; Hodder 1992).

This deconstructionist reasoning which has plotted the downfall or at least the ‘defrocking’ of the self-congratulatory and imperious stance assumed by historians, has sought to undermine history (and by implication, archaeology) as a single, comfortable trajectory proclaiming the developmental superiority of the contemporary western world view. Hayden White (1971) has pointed out that history is essentially a narrative discourse as much imagined or invented—it can lay no legitimate claim to fundamental truths. Following Kant, he suggests that we are free to create the kind of history we want. From this it follows that we must pursue a plurality of histories, as the only logical, and indeed valid alternative to the procession of biased historical constructions that our society feeds on. Principal among these is the perpetuation of the myth of history as a single coherent trajectory with a clear progressive, evolutionary dynamic. Thus we confront the rather daunting spectre of Jameson’s (1991:34) dictum that our era is distinguished by ‘the one uniquely privileged symptom of a loss of historicity’. However, this sobering thought leaves us in something of a quandary, for if we are to jettison the idea of global history as promoted by writers such as Engels, Spengler and Toynbee, what are we to put in its place? Are we faced with the *horror vacuo* of relativism, of a world of endless ‘thick description’?

But the underlying angst in Jameson’s statement is perhaps misleading. Certainly the writing of grand narrative with its implicit model of progress is increasingly contentious, not to say futile—on the other hand, although replacing this model of linear temporality, of episodic accumulation, is decidedly nontrivial, we shall argue that the writing of history—and archaeology’s central part in such

a project—is eminently feasible. It is a question of recasting the problem and re-setting the discourse within another arena: one in which we confront an alternative model of causality and thereby create a different reading of Time. We shall argue that the success of such a project is dependent on its ability to create a *rapprochement* between the temporal nature of social phenomena and the nonlinear temporalities which are resident in and central to the structural dynamics which articulate historical process.

What we are suggesting is nothing less than a radical shift in the dominant conception of causality within archaeological theory—one in which the relationship between contingency and determinism is recast, so as to better encompass the temporal nature of the social-historical dialectic as it is acted out both at the local scale and at the level of long-term dynamics.<sup>1</sup> We might reasonably ask what consequences this new reading of time might have on archaeology and, additionally, how might it affect the construction of narrative history? It is to these issues and to the perceptual and philosophical shift which they imply—not just for an archaeological epistemology, but rather in providing a basis for a revised ontology—that the remainder of this chapter will concern itself.

## ARCHAEOLOGICAL TIMES

### Objectified time

Our first task is to situate these questions within the general context of the representation of time within the practice of archaeology. Archaeology is, for all practical purposes, dominated by a chronocentric discourse—a discourse spiralling ever inwards in search of the perfect, coherent temporal ordering. The past is to be understood as conforming to a series of discrete periods accounting for different developmental cultural periods. Ultimately these periodizations provide what is regarded as an unambiguous foundation upon which history can be written.

Until recently the temporal discourse in archaeology was marked by its objective detachment and almost non-problematic nature; time was somehow self-evident. However, in recent years, the gradual percolation of postmodern theory through the social sciences has begun to erode this stance, with a number of archaeologists proclaiming the need for a re-theorization of time within the discipline (e.g. Bailey 1983, 1987; McGlade 1987, 1990; Shanks and Tilley 1987; Gosden 1994; Olivier 1996; McGlade and van der Leeuw 1997). A key characteristic of this reorientation is that despite the divergent approaches represented by these authors, much of the underlying advocacy is consistent with a postmodern world view, and hence discussions on the nature of time have been accorded a prominent role within the postprocessual project. Thus, the experiential nature of time, i.e. its human face, has become a dominant focus as an antidote to the omnipresence of objective, measured time within archaeological practice.

Indeed, the rise of a new critical discourse on time within archaeology, while effectively challenging long-standing assumptions on the 'objective' nature of time, has yet to situate this critique within the realms of praxis. For beyond the relatively small theoretical territory delimited by this focus, and its legitimation at the hands of a restricted cabal of Anglo-Saxon authors, there persists a normative viewpoint with respect to archaeological research. In this domain where the majority of archaeological practice resides, time is seen as an abstract container of events supported by chronometric props; time is presented as sequence and interval—above all, it is objective and quantifiable (cf. Giddens 1986; Shanks and Tilley 1987; Gosden 1994).

Within this abstract framework, the multiple periodicities which make up and define social-cultural existence can, so it would seem, be compressed (smoothed over) and reduced to a sequence of dates. We can thus make a ladder of history on whose rungs past events are placed. Disjunctions or discontinuity in the chronological scheme are viewed as simply hiccups—gaps whose elucidation waits the arrival of new data. Such developmental constructions can then be marshalled in the service of the 'seamless narratives' which provide the key to understanding, and hence to the interpretation of the archaeological record. The rather obvious fear is that, without these narratives, archaeology will fail in its self-appointed role of reconstructing long-term history. It will founder, lost amidst an inchoate mass of material, in which the spectre of disorder and unintelligibility looms large (McGlade and Picazo 1995).

This search for order, for the reduction of difference, is deeply embedded in the western intellectual tradition, where the pursuit of coherence and similarity forms the mainspring of classification: disorder, discontinuity and difference have no place in this scheme. What we are arguing is that the emphasis on similarity and concordance effectively distorts our reading of the archaeological record—we are led further away from the inherent diversity in our data, as its inherent complexity is homogenized and reduced to a convincing narrative supported by chronometric dating.

The seductive logic which underpins this type of archaeological reasoning is both dangerous and pernicious: dangerous because it privileges a single dimension of time as continuous and linear, and pernicious because it promotes a fictional view of human endeavour and the way in which time is constituted in social praxis. Additionally, however attracted we are as archaeologists by the logic of 'absolute' chronologies, we must confront the problem that the relational schemes constructed on the basis of a series of  $^{14}\text{C}$  dates, may be dangerously misleading. The apparent objectivity of such an exercise can be severely undermined by the fact that events which are scientifically assigned to the same time may have little relationship to one another. By the same token, of two events which appear as abrupt and radically discontinuous, one may be the outcome of processes whose causality lies in the distant past, while the other may be the product of a short, almost instantaneous action. Their chronological equation thus conceals more than it reveals (cf. Kracauer 1966; Starr 1966).

In fact, absolute chronologies such as those constructed by  $^{14}\text{C}$ -dating

methods, achieve their authoritative status as scientific fact by ignoring other times. The intrinsic times of the material culture being used are subordinated—relegated in favour of a series of ‘terminal’ times; this so-called ‘absolute time’ is nothing less than the time of organic decay—it is in fact statistical, probabilistic time with all its attendant uncertainties.

### **Relative chronologies**

The passage of time, and the desire to reconstruct historical event sequences is commonly approached through the construction of relative chronologies by means of typological frameworks: stylistic types, thus become reified as fossilized time. In addition, the act of constructing typological classification is achieved through the privileging of some attributes over others and this results in a loss of the intrinsic diversity of the material: chronological meaning is thus skewed in the service of reductionist science (cf. Olivier 1996:192). The inherent, problems in such practices—and particularly when typological schemes are erected on the basis of purely aesthetic criteria—are well known, yet they persist as a fundamental aspect of archaeological practice. For example the chronology of the Aegean Bronze Age is constructed around the changing stylistic ceramic modes represented by fine ware type fossils. In this way, aesthetic criteria alone become the chronological markers signifying distinctive temporal episodes in the historical trajectory of the Bronze Age. More problematic still is that such schemes have been frequently used to infer cultural change.

Clearly the privileging of a single category of material culture—fine ware—as the basis for chronological inference is, to say the least, problematic. We might reasonably speculate that were one to select coarse ware pottery in place of fine ware, we might arrive at a rather different temporal schema. Not only that, but, given the fact that coarse ware is generally the material used in domestic contexts for cooking and other household chores, we confront the relationship between chronology and gender. For example, recent research (Gonzalez-Marcén 1992) has demonstrated the way in which chronologies are conventionally constructed on the basis of male grave goods. Using an example from the Argaric Bronze Age in south-east Spain, the author shows that, by contrast, chronological schemes based on female grave goods result in a radically different chronological ordering. The clear message of such studies is that they demonstrate the arbitrary way in which cultural inference, is constructed, i.e. on the basis of restricted and gender-insensitive criteria. The reduction of difference implied by such methods thus may be said to be one of the singular casualties of archaeology’s chronocentric preoccupations.

## CHRONOLOGICAL VERSUS KAIROLOGICAL TIME

### Social times

The tenacity with which the normative model of archaeological periodization has prevailed is as much a testimony to a kind of intellectual inertia as to any stringently held philosophical position. Since its nineteenth-century origins, archaeology, in company with the natural sciences, has been unwittingly subject to the tyranny of historical narrative and, as a result, has evolved a singularly predictable relationship with temporal phenomena. As with other disciplines which emerged amidst the nineteenth-century evolutionary ferment, archaeology was quick to establish its credentials as providing a practical methodology for interpreting the linear passage of time. The appeal of chronostratigraphic methods was such that they were viewed as ‘natural’—an elegant demonstration of the laws of progress. For more than a century, the pursuit of archaeological knowledge was to be largely conducted under the aegis of this model.

That such a situation could persist is a function of the influence of evolutionary thinking which had effected a revolution in the understanding of earth history, thanks largely to the geochronological schemes of Hutton and Lyell. These revolutionary works were destined to add fuel to the Enlightenment idea of progress. Enshrined in the work of Comte, Darwin and Marx, the idea of progress bestrides nineteenth- and early twentieth-century intellectual life, assuming the role of *Zeitgeist*. Within such a climate, with its universalist principles, the very notion of civilization became synonymous with progress,<sup>2</sup> Herbert Spencer even going so far as to consider it a basic law of the universe.

However, the privileging of this cumulative, developmental perspective on time was achieved at the expense of another conception of time: *kairological* time. The Greeks saw this time as distinct from chronological measure; kairological time was, by contrast, experiential time, the time accorded to the duration of human-centred activities (Hahn 1976:826).

It is a curious fact that given the central role of kairological phenomena in the processes of social reproduction, and also the existence of abundant ethnographic and social anthropological data, this temporal model has, until recently, been largely ignored. For example, early sociological contributions which stressed the *qualitative* as opposed to the measured, quantitative nature of time (e.g. Hubert 1905; Sorokin and Merton 1937; Durkheim 1961) have had no impact on the discourse of archaeology until relatively recently. The emphasis placed by these authors on both the quotidian routinization of time and its social construction is only now becoming a subject of discussion (see Gosden 1994 for a review). A central premise in much of this work reflects a re-reading of preoccupations with the multiplicity of temporal rhythms which make up social life, foregrounding also the importance of human bodily involvement with the world following the work of Husserl and Heidegger.

It is in this sense, that the temporal nature of human action and the construction of the life-world as outlined by Schutz (1962) has prompted a new interest in

phenomenology; hence a focus on the experiential nature of time and space has emerged as a prominent postprocessual activity. This is to be seen, for example, in Gosden's (1994) attempt to rehabilitate time, so as to render it more relevant to archaeological practice. His solution, following Heidegger, is to concentrate analysis on the primary social/temporal opposition as he sees it, between 'public' time and 'social' time; the nature of social process is thus seen as the meeting of habitual and public times (1994:190). Thus:

Public time arises as a coping mechanism for the problems of habit, and over time shades off into habitual action, forming a temporal cycle of thought and unthought patterns of life.

(1994:189)

But the complexity of societal structuring cannot be reduced to a meaningful oppositional schema which enlists the idea of public time as a way of coping with 'the problem of habit'. It needs to be said that the notion that habitual, routine action is a priori a problematic of social space is, to say the least, contentious. Such ideas—particularly the binary opposition implied between public versus private—are especially problematic with respect to the sexual division of labour and the temporalities governing women's work. For example both Leccardi (1996) and Picazo (1997) have drawn attention to the complex sets of domestic rhythms which define household activities. Leccardi, in company with other feminist theorists, explicitly rejects the institutional division of time into two contrasting spheres since this perpetuates the equation of 'public time' as a dominant masculine domain centred on production, set against a 'private' or 'reproductive time' associated with women's work. Moreover, the process of grafting on a productive/reproductive opposition to archaeological contexts may be wholly misleading, since the classification is itself a product of modernity.<sup>3</sup>

On the other hand, Picazo (1997) has provided a useful context within which to discuss such issues in terms of *maintenance activities*, i.e. the routine care, feeding and welfare of the social group—tasks which are normally carried out in the domestic sphere by women. Such activities are conventionally devalued as 'domestic' and therefore of a lower order, or alternatively have been relegated to the realms of 'non-productive' labour in Marxist analysis (1997:60–1). From this perspective, it seems that the 'problem of habit' and its potential solution in the public sphere is a pseudo-problem. If the temporal aspects of social life are to have any currency, then the only useful model is one in which they are seen as being mutually embedded, and this within an explicitly gender context.

While it is clear from the insights of Hubert, Durkheim and Heidegger, that archaeology would do well to engage more fully with the temporal structures resident in the day-to-day structures of lived experience, this journey into 'subjective time' is, of itself, insufficient to provide us with a convincing narrative of the long term. Thus, although the focus on time as a social construction has added a valuable theoretical layer to our understanding of temporal phenomena—especially in eschewing assumptions of 'objectivity'—nevertheless, these approaches



are strikingly deficient in (i) their synchronic character, (ii) their normative conception of change and (iii) their characterization of the long term.

## HISTORIOGRAPHY AND THE TIME OF NARRATIVE

One celebrated attempt to go beyond the fixity of chronological episodes is the work of the *Annales* School founded by Febvre and Bloch in 1929. Their critique of history as a sequence of discrete events in the service of chronology and its attendant cult of detail, was to provide the impetus for a manifesto of radical change. An important part of their central thesis was that, by contrast to normative schemes of history based on the primacy of great men or single political events, they proposed to emphasize instead the correspondences and interactions between material, social and mental structures. In fact, these ideas had already been formulated at the turn of the century by François Simiand who was to exert a major influence on *Annaliste* thinking. Simiand (1903) had published a controversial critique of what he referred to as the ‘idols’ of the tribe of historians, the idol of politics, the idol of the individual and the idol of chronology. This work sees the first explicit statement decrying the dominance of *histoire événementielle*—‘event-centred history’.

Braudel’s central thesis was that social change was a confluence of the intersection of different temporalities and these were basic to the structuring of the *longue durée*. This focus on the long term has meant that his work has had a particular resonance for archaeology,<sup>4</sup> with a number of researchers arguing for the importance of the Braudelian model, though from divergent perspectives (e.g. Hodder 1987; Bintliff 1991; Knapp 1992).

Braudel’s model is innovative precisely because it confronts the difficult issue of how to conceptualize the trajectories of social evolution, and underlines the necessity for a new reading of the relationship between structure and event. However, its preoccupation with the structural scaffolding of history means that the role of individual events and of human agency tend to assume an epiphenomenal role, consigned to the marginalia of history. Individuals are merely the ‘foam’ cresting momentarily on the waves of history—an idea epitomized by a display of fireflies Braudel once observed in Brazil:

there pale lights glowed, went out, shone again, all without piercing the night with any true illumination. So it is with events; beyond their glow, darkness prevails.

(1949:721; see also 1980:10–11)

In addition, Braudel’s emphasis on geo-historical processes effectively privileges the role of environmental variables, and it is this incipient determinism at the heart of the *longue durée* which is problematic. It represents a view of structure as a largely monolithic entity, only slowly changing, and thus effectively downplays the role of contingent events in the emergence of social-spatial structure. Such events are swamped by the inexorable tide of history.

Certainly, there is a curious sense in which the apparent sophistication of Braudel's method almost seduces us into believing that we are engaging with a non-deterministic trajectory. But this is illusion, for the narrative structure he sets up is constructed on the primacy of geo-historical processes over the role of human agency; inevitably we are left with a causal structure that is wholly determined—one in which 'the long run always wins in the end'.

Despite the importance of the *Annaliste* foregrounding of the role of different temporal scales in the creation of the historical trajectory, from an archaeological perspective—and *pace* the insistence of Bintliff (1991) and Knapp (1992)—it is not clear what advantage is to be accrued by adherence to such a model.

Perhaps the most seductive but ultimately disappointing feature about the Braudelian enterprise is its inability—despite its innovative merits—to provide a convincing temporal model of the long term; it is not enough to declare that different periodizations are represented by different times. Althusser and Balibar (1968) have also argued that the 'objective' nature of Braudel's scheme effectively freezes time into sets of synchronic stages, neglecting the way that social times are embedded in a social 'totality'. Thus, while the *Mediterranean* study was designed to demonstrate that time moves at different speeds, what is not explicit is just how these temporalities intersect in a *dynamic* sense. Moreover, there appears to be no space for the role of episodic or abrupt change: continuity seems to be emphasized at the expense of discontinuity. The primacy accorded to *la longue durée* presents us with an essentially linear view of history

What this amounts to is a lack of focus on the way in which different temporalities—short, medium and long—themselves subsume a variety of differential rates of change with respect to social, political and economic criteria: it is these *changing rates of change*, with their accelerating and decelerating rhythms, which constitute the structural history of societies, and which in the final analysis produce a model of history as a non-linear dynamical system.

## FROM LINEAR TO NON-LINEAR CAUSALITY

### Introduction

Summarizing our discussion so far, we have encountered three different causal frameworks for the construction of historical narrative: the first model—bottom-up—operating at the micro level and reifying individual event sequences, is exemplified by the ordering of discrete chronometric sequences to form a cumulative evolutionary trajectory; the second—also bottom-up—is based on a view by which temporal sequencing has no objective meaning independent of the experience of the observer; the third model—top-down—by contrast eschews the role of events and downgrades the ultimate importance of human agency in effecting long-term structural change. These models appear to be irreconcilable, representing, as they do, both sides of an ongoing event versus

structure debate, an omnipresent feature of current theoretical discussions within archaeology and the social sciences generally.

What we shall argue, however, is that there is another approach to such issues, and one whose unique merit is that it can encompass both polarized states, effectively uniting event and structure in an alternative evolutionary synthesis. This model challenges the dominance of a linear approach to temporal questions within archaeology.

### **Linearity versus non-linearity**

That we live in a non-linear world is an incontestable fact; in a post-Newtonian world, large effects are not necessarily the result of large causes. Nevertheless, our adherence to, and insistence on, the primacy of linear causality is a ubiquitous feature of much of the scientific enterprise upon which our society is founded. Yet from the perspective of the end of the twentieth century this is somewhat surprising, not to say puzzling; this century more than any other has been marked by its fundamental contribution to the re-theorization of time and space, i.e. their irreducibility in Einsteinian relativity and quantum mechanics. Additionally, one of the most important revolutions of the past two decades has been the development of non-linear science. As a result, the evolutionary behaviour of many systems—climatic, geomorphological, ecological, biological and economic—has been shown to exhibit counter-intuitive properties and a range of complex chaotic behaviours.

Yet the paradox is that the dominant model of scientific inquiry which pervades academic discourse is predicated on assumptions of linear determinism. Within archaeology and history, for example, we persist in erecting interpretations and meaning structures which are based on a causal determinism. Indeed, one of the most persistent visions in western society involves the construction of time as a linear trajectory; all past, present and future events travel on this path, and there is an implicit assumption that scientific endeavour is somehow involved in the prediction of the future. For example, the relationship of archaeology to long-term history would seem to be self evident; yet archaeology has conventionally conceived of this relationship in a rather narrow sense. Thus, the long-term evolution of social, political and ideological structures is consistently framed within a model which gives primacy to the temporal development of material culture. In this model, time is therefore pre-eminently concerned with the progressive development of productive economic forces.

The philosophy of progress which underwrites archaeological theory and its preoccupation with notions of origins as well as models purporting to trace the development of 'complexity' is not to be understood as simply the residue of nineteenth-century ideas. On the contrary, Fukuyama's recent book *The End of History and the Last Man* demonstrates a continuing preoccupation with a progressive model of history, confirming also that it is embedded within western

consciousness. The persistence and tenacity of such views is particularly worrying, for they act to obscure the real complexity which underlies the historical dynamic. In fact, it is relatively easy to argue that the exclusion of alternative models of evolution and causality from academic discourse has had a profound influence on the nature of explanation in the social sciences generally.

### **The end of the old order**

By the latter decades of the nineteenth century the old temporal-spatial order was already crumbling. Its death knell—though unrecognized at the time—was struck by Henri Poincaré with his investigations into *qualitative dynamics*. The complex topological structures (attractors) envisioned by Poincaré, but unseen until the computer revolution of the 1960s, revealed new truths about the structure of complexity: order and chaos, for so long assumed to be irreconcilable opposites, were now linked in a hitherto unsuspected relationship. This is the paradoxical world of deterministic chaos. The advent of probability, and the emergence of non-Euclidean geometries together with Poincaré's discoveries served to obscure the boundaries between art and science, and the dichotomy set up between the so-called 'objective' and 'subjective' sciences was exposed as false. Nevertheless, it is noteworthy that for much of the ensuing century this false dichotomy has been—and continues to be—constantly rehearsed.

In turn, these new world views were to foreground another problem: the problem of prediction in complex systems. The revolutionary significance of this issue was to be further confirmed by the discovery that many physical, chemical and biological systems possessed the capacity to self-organize and thus to spontaneously generate structure. In such systems evolutionary structure occurs through a process of unstable transitions, via bifurcation phenomena. Bifurcations are triggered at points of instability, during which the system undergoes qualitative restructuring. The fact that spatial-temporal patterning can occur in systems far-from-equilibrium has been demonstrated by Prigogine and co-workers who have coined the term 'order through fluctuation' to describe the process (Nicolis and Prigogine 1977). The fundamental point being made is that *non-equilibrium* behaviour—as an intrinsic property of social systems—can act as a source of *self-organization*, and hence is the driving force behind qualitative restructuring as the system 'evolves' from one state to another.

These types of evolved structures, or 'dissipative structures' as they are known, rely on the action of fluctuations: below a critical threshold they are damped and have little effect on the system. Beyond this threshold, however, they become amplified and generate new macroscopic order. Thus, within this paradigm, evolution occurs as a series of *phase transitions* between disordered and ordered states; successive bifurcations generating new ordered structure. The critical role accorded to non-equilibrium depends on the interaction between perturbations or 'noise' which is endogenously created, and random fluctuations whose origins lie in the environment.

More recently, computational research into the evolution of complexity has suggested that complex evolutionary systems driven by self-organizing dynamics preferentially evolve towards the boundary between order and chaos—a phenomenon described as ‘self-organized criticality’ (Bak and Chen 1991).

Whatever the ultimate merits of these approaches, from an evolutionary perspective they are conceptually superior to the linear and step-wise solutions of conventional neo-evolutionary schemes. Moreover, these ideas present us with a morphogenetic metaphor which lends itself to the description and interpretation of discontinuous patterns of change. Thus it places emphasis on the essential *disequilibrium* properties at work within social systems, allowing us to focus on *thresholds* which may be identified as precursors of social transformation. As a consequence, evolution may proceed precisely because of the *non-adaptedness* or *non-optimal* states within system structure (cf. Allen and McGlade 1987).

## THE STRUCTURE OF DISORDER

A fundamental attribute of these evolutionary ideas is the importance of positive feedback or *self-reinforcing* mechanisms as Arthur (1988a) has characterized them. Broadly speaking, it is the existence of processes such as reproduction, cooperation and competition at the interface of individual and community levels which can, under specific conditions of amplification, generate unstable and potentially transformative behaviour. This is clearly the case both at the level of population dynamics and equally within complex exchange and redistribution processes. Instability then is essentially a product of the presence of these self-reinforcing or *auto-catalytic* structures operating within sets of human relationships and at higher aggregate levels of societal organization. Of crucial importance to an understanding of these issues is the fact that networks of relationships are prone to collapse or transformation, independent of the application of any external force or perturbation.

The complexity of social systems is in large part a consequence of the existence of multiple modes of operation, and hence of multiple sets of decision-making criteria. As a consequence, the dominance of highly non-linear interactions renders these societal systems endemically unstable. It is precisely the action of such non-linearity which is responsible for the emergence of erratic, aperiodic fluctuations in system behaviour. These highly irregular fluctuations (previously dismissed as environmental ‘noise’) in fact contain an elusive and subtle structure known in the mathematical literature as *chaos*. First described in a seminal paper by Lorenz (1963) the important contribution of this work was in demonstrating that chaotic behaviour was a property of purely *deterministic* systems, i.e. systems unperturbed by extraneous noise.

As a result of subsequent observations in the physical, chemical and biological sciences, there is something of a consensus emerging on the role of chaotic dynamics in the time evolution of systems as diverse as global climatic regimes,

biophysical structures and physiological processes such as blood flow. In consequence, we now know with some certainty that the seeds of aperiodic, chaotic trajectories are embedded in all self-replicating systems, and these intrinsic nonlinear interactions have become the object of intensive study. Such dynamical systems have no inherent equilibrium but are characterized by the existence of multiple equilibrium and sets of coexisting attractors to which the system is drawn and between which it may oscillate.

A critically important characteristic of chaotic systems whether natural or physical, is that the possibility of chaos undermines the idea of prediction, i.e. in the sense in which it is employed as a fundamental tenet of conventional scientific method. This property has come to be known as 'sensitivity to initial conditions' (Ruelle and Takens 1971), and simply means that nearby trajectories will diverge on average exponentially. Consequently, given any observational point, it is impossible to make accurate long-term predictions of system behaviour.

From our current perspective with respect to understanding the relationship between event and long-term structures, the discovery of self-induced complex dynamics is of profound evolutionary importance, since we can now identify a powerful source of *emergent behaviour*. The origin of the heterogeneous and asymmetric behaviours observed in the archaeological landscape may not prove as intractable as they appear; thus the creation of spatially heterogeneous structures may indeed have chaotic origins. What is clear is that, far from promoting any pathological trait, the aperiodic oscillations resident in chaotic dynamics may yet perform a significant operational role in the evolution of the system, principally by increasing the diversity or 'degrees of freedom' within which it operates (cf. Conrad 1986). This in turn may allow us to re-situate problems of adaptation and see a potential theoretical solution in the coexistence of multiple attractors as potentially defining a flexible domain of adaptation, as opposed to any single state. We thus arrive at a paradox where chaos becomes responsible for *enhancing the robustness of the system*.

### **The evolutionary importance of instability**

In many ways, the central thrust of our argument has emphasized that discontinuity, though a ubiquitous concept in societal structure, has yet to be accorded the importance it so clearly merits. The emphasis on order as an ingrained intellectual 'truth' has effectively subverted its place within the dynamic description of human systems. Indeed, the most exciting aspect of more recent discoveries in the natural sciences amounts to the confirmation of the fundamental role played by bifurcations, phase transitions and fluctuations in the time evolution of nonlinear systems. Additionally, the presence of non-linearity within social systems introduces the possibility of systems with multiple equilibriums.

The conceptual shift implied by an emphasis on discontinuous, emergent properties of societal systems is attractive precisely because, in emphasizing social structures as self-organizing entities within a complex open system, conventional

attitudes to the homogeneity of time and space are effectively redundant. Thus we move from a world defined by classical symmetric properties to one where the possibility of no equilibrium at the heart of societal organization can generate symmetry-breaking instabilities. From an evolutionary perspective, i.e. defined here as *structural elaboration* rather than developmental complexity, what this means is that the process of structural transformation can result in a wide diversity of evolutionary patterns; indeed a whole behavioural spectrum is possible, ranging from homeorhetic states on the one hand, to an array of complex unstable trajectories at the other extreme.

Instability, far from being an aberration within a 'stable' system, becomes fundamental to the reproduction of the social order. Under this view it becomes possible to see the long-term evolution of societal structure as a history of discontinuity in social space; i.e. history not as a finely spun homogeneous fabric, but as being punctuated by a sequence of phase changes as the result of both conscious and unintended actions. Such discontinuities are in fact thresholds of change, where the role of human agency and/or idiosyncratic behaviours assume paramount significance in the production and reproduction of societal structures.

## ARCHAEOLOGY AND NON-LINEAR DYNAMICS

For archaeology—and indeed the social sciences generally—a core theme emerging from these studies is the need to view human—ecological relationships as a mutually reinforcing non-linear dynamical system. This serves to underline the fundamental opposition, or tension, between the temporal rhythms which are embedded in natural processes and those resident in societal structures. It is the asymmetry in such mapping, induced in part by the role of conflict and contradiction, which provides the context for abrupt discontinuous transition through bifurcation, and the subsequent transformation of social space.

Until recently, these ideas lay outside the realms of archaeological theory. However, a growing body of research is beginning to demonstrate the importance of the non-linear paradigm for archaeology—particularly with respect to a revised evolutionary model (e.g. McGlade 1990, 1995a, 1995b, 1997; van der Leeuw 1990; van der Leeuw and McGlade 1993, 1997a, 1997b; Olivier 1996). A prominent feature of several of these studies is the role of self-reinforcing feedback processes in amplifying small-scale, endogenous variations, and the way in which these can produce large-scale change. From a causal perspective, exogenous explanations for culture change become unnecessary and, when invoked, must always be subject to scrutiny. But perhaps the principal lesson to be drawn from the evolutionary structuring implied by the action of non-linear processes, is that some of the enduring 'problems' of archaeological explanation such as the transition to agriculture or, for example, the collapse of complex societies, is entirely explicable within a non-linear paradigm.

The role of bifurcations in these processes is critical. For example, within the Bronze Age of southern Britain, the collapse of Wessex II has been interpreted as

a bifurcation in societal ideology and organization (McGlade 1990, 1997). In a similar manner, we may consider the sudden collapse of order engendered by both the French and Russian revolutions as true bifurcations, followed by the establishment of an unstable threshold. What is characteristic of such situations, is that social and political organization tends to become non-focused and erratic as a consequence of the disappearance of old certainties and the onset of a period (of uncertain length) of the emergence of a fragile order. There is abundant evidence that during this interregnum period, when societal systems are highly unstable, they are susceptible to the action of chance events which can lead the system along one of a number of unplanned developmental trajectories.<sup>5</sup>

Additionally, the idea of social systems potentially moving between different attracting states through abrupt phase transitions has been advocated as a model for the evolution of urbanism by van der Leeuw and McGlade (1993, 1997b).

What is clear is that the conditions under which social configurations become unstable and subsequently reorganize or change course have no inherent predictability; the diversity which characterizes all human behaviour guarantees this. It is this diversity which is critically important from an evolutionary perspective, for it accounts for the system's 'evolutionary drive' (Allen and McGlade 1987). What this means is that the existence of idiosyncratic and stochastic risk-taking behaviours acts to maintain a degree of evolutionary 'slack' within social systems; error-making strategies are thus crucially important. In fact, without the operation of such *non-optimal* and unstable behaviours, we effectively reduce the degrees of freedom in the system and, hence, its creative potential for evolutionary transformation is severely constrained.

One of the central issues brought to the foreground by such cultural dynamics concerns the question of *emergence*, i.e., the role of phenomena such as collective action or the spontaneous generation of new modes of behaviour—particularly the propensity for societal groups and organizations to generate options which are the result of unplanned or unanticipated outcomes. To a large extent, it is these processes which are at the root of the diversity and spatial non-homogeneity which we recognize in the archaeological landscape.

Likewise for human systems, it is the presence of self-reinforcing or autocatalytic structures within sets of human relationships and societal organization which renders them intrinsically unstable. This is clearly applicable both at the level of population dynamics and equally within complex exchange and redistribution processes, where work on the simulation of prestige goods economies has demonstrated the manner in which time delays can act to produce chaotic trajectories (McGlade 1990, 1997). Similarly, in work exploring the structural dynamics of resource exploitation by competing agents, Huberman (1988) has shown that in situations where decision-making is both based on incomplete knowledge and accompanied by time delays, periodic or chaotic solutions in resource allocation can occur.

More recently, Olivier (1996) has invoked non-linear dynamical techniques—specifically fractal geometry—to provide a radically different reading of iron age funerary assemblages. He shows how the particular



observational scale adopted ultimately constrains and radically affects our reading of temporal and spatial dynamics. More fundamentally, Olivier's research, particularly with respect to the scale invariance revealed by the data, presents us with a wholly different set of epistemological and ontological considerations for archaeological interpretation.

What all these new archaeological applications share is a desire to render evolutionary complexity within terms of a model of change that eschews simplistic causal mechanisms. In addition, they make it clear that a non-linear dynamical reading of conventional archaeological problems may hold the key to providing a coherent explanation for the relationship between event and structure.

## SOCIAL-NATURAL CO-EVOLUTION

### Human-environment dynamics

A fundamental aspect of the re-reading of archaeological method and theory advanced by postprocessual archaeologies, has been the almost total dismissal of the environment. This has meant an undertheorized—not to say non-existent—concept of human—environment interaction. Such a neglect arose as a predictable reaction to the deterministic excesses of economic approaches to prehistory such as the Cambridge palaeoeconomy school and its offshoots. The wholesale rejection of ecological concepts in pursuit of the 'meaning structures' which articulate social life has effectively relegated environmental dynamics to the status of epiphenomenon—the somewhat *passé* preserve of out-of-touch processualists. The dominance of such a position has, in fact, had a debilitating effect on theoretical discussion, for it has bred an ignorance not simply of the spatial—temporal complexity of ecological dynamics, but of the crucial *co-evolutionary* dynamic that defines social—natural interaction.

This lacuna is all the more curious in view of archaeology's renewed interest in landscape (e.g. Thomas 1993; Tilley 1993, 1994; Barrett 1994; Gosden 1994; Ucko and Layton 1998), and especially in issues related to the social construction of space. However enlightening these discussions are—and indeed they present a much needed counter to normative adaptationist studies—they may reasonably be accused of presenting over-socialized views of the relationship between people and their environment. For example, in arguing for the primacy of practice(s) and the need for more phenomenologically informed perspectives, there is a real danger in relegating the non-human or biophysical world to the status of marginalia. For example, phenomenological approaches, in their pursuit of an experiential, subject-centred archaeological practice, promote a discourse which, while focusing on the existential nature of human interaction and communication with the spatial environment, effectively dislocates social practice from the ecological milieu which represents its primary subsistence and welfare context (McGlade 1999).

A major consequence of the dismissal of environmental/ecological criteria—

summarily proscribed as adaptationist, systemic and evolutionist—has led to an over-socialized view of nature. In effect, archaeological theory has moved from one species of reductionism to another—from the environmental reductionism characteristic of palaeoeconomic theory to a set of diametrically opposed, but equally constricting views proffered by social theoretical approaches which privilege the role of meaning. The plainly deficient pursuit of an ‘objective’ scientific archaeology has been replaced by a critical model which proclaims itself as simultaneously anti-scientific and relativist. This ‘idealist’ tendency in the social sciences is ultimately constrained, for it is unable to deal with the ecological and social consequences of *unacknowledged* conditions of social practices in relation to the natural world, and with respect to their unintended or unforeseen consequences.

What we are arguing is that any representation of cultural schemata (social, symbolic, structural) which distances itself from the temporalities of lived experience, particularly the way that these are situated in natural and physical phenomena, is problematic. Without such embedding we are in danger of constructing fictional landscapes—landscapes whose only points of reference are residual networks of meaning structures. At worst, the reductionism inherent in such approaches tends to render our interpretations of social—natural dynamics incomplete and ultimately misleading.

In an effort to obviate the false dichotomy represented by processual/post-processual positions, recent work (McGlade 1995a) has sought to emphasize the importance of a *co-evolutionary* dynamic for understanding social—natural interaction. This argues for a non-functionalist human ecology in which human agency can be restated within a social—natural context that is at once evolutionary and contingent. We thus need to develop appropriate strategies to contribute to the construction of a dynamic ecology of social space seen as a long-term, dynamic process—a *human eco-dynamics*. This concept refers to the importance of long-term dynamics in generating structure, and views the human—environment *problematique* within an explicitly ecological and social-historical frame of reference. Such a research agenda is designed to present a more complete and integrated view of human societal structuring; it thus eschews current developmental evolutionary models, emphasizing, in their place, a discontinuous, non-linear perspective that acknowledges the crucial importance of different temporalities and scale-dependent dynamics in the emergence of societal structure.

### **CHARACTERISTIC SCALES OF HUMAN EGO-DYNAMIC PHENOMENA—EMBEDDED TIMES**

One of the primary issues emphasized by a human eco-dynamic perspective is the centrality of temporal dynamics, i.e the temporal edifice of the social—natural world is articulated by sets of temporalities we may define as *intrinsic times*. What we are saying is that the biological, social, political and technological

systems within which humans are situated, can be characterized by inherent system times (Kümmerer 1996). These are the times which inhere in all social and natural activities—the turnover, or reproduction times—extending from the reproduction of the cell, through seasonal plant and animal cycles to larger-scale (global) glacial time scales. In a sense, all living things can be defined by a unique *chronotype*, or life time (Fraser 1987; Bender and Wellbery 1991).

These intrinsic times, and their spatial correlates, collectively form a nested spatial-temporal hierarchy. From a landscape archaeological perspective, recent research has demonstrated the multi-scalar temporalities which structure the semi-arid environments of the Vera Basin in south-east Spain (Courty *et al.* 1995; Fedoroff and Courty 1995; McGlade 1995b). The primary message of this research is that landscape structure emerges as a result of the intersection of temporalities, ranging from the slowest processes such as tectonic movements ( $10^7$ ), climatic cycles ( $10^5$ ), all the way to population dynamics ( $10^2$ ) and other micro-level phenomena ( $10^{-1}$ ). Importantly, these temporalities represent differential rates of change. Thus, we have slow, cumulative rates represented by glacial and tectonic movements, coupled with soil or vegetational dynamics which display rapid turnover. Research on a number of ecological systems shows that discontinuity—and frequently catastrophic outcomes—can be the result of the conjuncture of ‘fast’ and ‘slow’ variables (Holling 1986). Such complexity is further enhanced by the superimposition of human social, political and economic systems. What we have ultimately are sets of intertemporal dependencies, defining a reciprocal dynamic that maps the social on to the natural and the natural on to the social.

This emphasis on intrinsic times and their scalar attributes underlines the importance of studying evolutionary processes, not simply in terms of change, but from a perspective that foregrounds the role of self-reinforcing (positive feedback) processes in generating structure in societal systems. Moreover, it is not change *per se* that is important, rather as archaeologists we must shift our focus to questions which deal with (i) the *rate* of change and, perhaps more important, (ii) the *change* in the rate of change. It is these attributes which above all define system dynamics.

This latter point is particularly important in view of current evolutionary perspectives which view change in social and natural systems as the sole product of contingent forces. The emergence of unplanned and unpredictable events at the heart of the social process is thus assigned to the laws of chance.<sup>6</sup> However, the confidence with which such a view is asserted is far from unassailable and ultimately may be seen as reductionist. It is unsatisfactory precisely in its attribution of all human creativity to the realms of the unintended, the fortuitous and the random. Social evolution, it needs to be said, proceeds neither as a sole consequence of contingent events, nor, alternatively, by the action of deterministic processes. What we shall argue below, is that social evolution is more usefully conceived as a compound, discontinuous narrative. In a sense, we might do well to think in terms of what Fischer (1976) has called ‘braided narratives’, as a means of creating a conjuncture between traditional narrative and the analytical rigour of the natural sciences.

## TOWARDS AN ALTERNATIVE ARCHAEOLOGICAL NARRATIVE: A MODEL OF 'CONTINGENT NECESSITY'

One of the primary implications of the alternative evolutionary paradigm that emerges as a consequence of self-organization is that evolutionary structuring in social—natural systems thus must be viewed as a confluence of structurationist processes which underline the role of human agency and the non-linear dynamical networks within which they are situated. Such a model underlines the importance of the unintended, irrational, stochastic facets of human decision-making and its role in generating structure at critical moments in the history of societal events.

The crucial issue here is the question of structural transformation in societal systems and the role of both necessity and chance in generating a landscape of bifurcating possibilities. In the language of non-linear dynamics, necessity (in the guise of a dominant ideology, or political and economic organization) takes history along a particular path where deterministic processes dominate, until it reaches a bifurcation point. At this juncture, as the societal system becomes prone to stochastic fluctuations or unplanned impacts, contingency plays an increasingly influential role in directing the system towards a new historical trajectory. This appears to us as an unintended consequence. We can usefully envisage history as a model of 'contingent-necessity' (Shermer 1995), i.e. 'a conjuncture of events compelling a certain course of action by constraining prior conditions'. This is, of course, a definition of chaos; i.e., the operation of stochastic behaviour in a deterministic system. As Ian Stewart (1989:17) states, if stochastic behaviour is 'lawless and irregular' and deterministic behaviour is 'rule by exact and unbreakable law', then chaos can be defined as 'lawless behaviour governed entirely by law'. It is this conjuncture of necessity and chance which constitutes the history of the system. Thus necessity takes a historical system down a certain path until it reaches a bifurcation point. At this point contingency plays an exaggerated role (fluctuations) in pushing the system towards a new path, which in time develops its own powerful necessity, with the result that contingency is attenuated until the system reaches the next bifurcation (Prigogine and Stengers 1979).

In fact, random and predictable, long regarded as opposites on a qualitative continuum, are not mutually exclusive models between which we must choose. They represent qualitative characteristics which will always produce different levels of impact and will vary also in the nature and timing of their respective influence on any given chronological sequence. While it is clear that historical determinisms are embedded in social and economic systems, and exert an important force on individuals and societies, contingencies act often irrespective of the forces (necessities) influencing them. It is in this way that they simultaneously reshape future necessities (Shermer 1995:70)

The natural and social worlds we inhabit are replete with examples of the way that essentially arbitrary or unintended features emerge to determine subsequent historical pathways. As Brian Arthur (1988a) has pointed out, the evolution of technologies provides us with a number of examples where the role of chance

elements create entirely new irreversible evolutionary trajectories. For example the first typewriter keyboard systems emerged in a competitive market, with the eventual dominance of the current QWERTY system being due more to the action of chance rather than strict technological advantage; in fact this system was inferior to at least one other of its rivals. In another example, Arthur (1988b) discusses the role of 'historical path dependence' and points to the importance of the role of both chance and necessity in directing the evolution of urban agglomerations. In explaining the historical evolution of urbanism at the regional level, he uses an analogy from genetics, i.e., that chance events act to 'select' the pattern that becomes fixed, but regions which are economically attractive have an intrinsic 'selectional advantage', and thus have a higher probability of achieving dominance. These examples cited by Arthur might collectively be described as conforming to the 'QWERTY principle of history': historical events that come together in an *unplanned* way, create inevitable and irreversible historical outcomes.

### **A REFLEXIVE CONCLUSION: ARCHAEOLOGY AS LONG-TERM HISTORY**

What then are the primary implications to arise from the foregoing excursus into temporal phenomena? In the first place, it becomes clear that a non-linear world view presents archaeology with something of a dilemma: a non-linear view of time means the end of history as we have come to know it, i.e., as developmental sequence and grand narrative. In short, it renders obsolete models based on Aristotelian causality and it relegates the certitude of Newtonian science with its implied reversibility to the realms of science fiction. By contrast to the certainties provided by the Newtonian/Cartesian world order with its temporal coherence, we are pitched into a new probabilistic territory; we are adrift in an ocean of times, enmeshed in a universe whose only reality is the absence of certainty. Paradoxically, it is from this vantage point that we may be able to construct a more sophisticated type of archaeological interpretation.

Despite the oft-cited claims made by postprocessual rhetoric, that archaeology has experienced a new awakening, has acquired a new sensitivity to postmodern critique and the decentred subject, etc., and even a new appreciation of temporal phenomena, beyond the confines of the theorist's armchair the reality is somewhat different. Archaeological praxis is still wrapped in a Euclidean world view with its comforting proximate geometries—a world of secure mensuration, of impeccable metrological logic, of 'objective' reality which the observer can comfortably contemplate from the outside.

But, as we have argued, this mythical temporal and spatial world is entirely fictional. The landscapes within which the linear certitude of time could be inscribed have been replaced by a less predictable space; in Borges' terms by a more contingent trajectory composed of 'forking paths'. This is a world devoid of universal truths, it is a world inscribed by the capricious and the provisional, and

their ambiguous relationship with those deterministic, irreversible aspects of evolution. Thus, the world of absolutes has been replaced by a world defined only by the *possibility space* of action. In place of a knowable, measurable landscape we have an encounter zone where intertemporal schemata create convergence and divergence—not according to either deterministic or stochastic proclivities, but according to priorities governed by the operation of the nonlinear dynamics which lie at the heart of social and natural systems.

As Prigogine and Stengers (1979) have pointed out, this process of deconstructing classical science results in a new encoding of nature. Significantly, this involves the re-situating of scientists as intrinsic elements of the nature they describe, and is thus wholly in accordance with a postmodern perspective (cf. Hayles 1990) in which the temporal nature of the universe has no reality independent from those who participate in its social construction. A re-reading of history is the inevitable consequence.

History is, in the final analysis, a plurality of times—both continuous and discontinuous, the product of contingent and deterministic forces. But history is frequently written to fulfil a variety of ideals most of which are synonymous with the establishment of power structures, for political advantage, for racist or nationalist reasons, or simply to promote a progressive, developmental view of human social and cultural evolution. It is the defence of these frequently spurious trajectories that must be critically examined if we are to uncover the real structural, functional and meaning structures which underlie human societal engagement with the landscape and the world at large. Social-natural coevolution, with its intrinsic instabilities and non-equilibrium dynamics, is the clearest manifestation that we inhabit—and have always done—a non-linear world. Archaeology must begin to address the real implications of such a situation if it is ever to contribute substantive knowledge to the debates on long-term history.

Finally, we might usefully summarize the implications of the foregoing discussion on non-linear structuration, and specifically its general implications for archaeological research:

- 1 *a revised model of history*—it spells the end of seamless narratives—there is no single line running through history; it forces us to re-conceptualize history as a series of contingent structurings which are the outcome of an interplay between deterministic, stochastic and chaotic events; history is not the modernist symbol of a tree with branches, but rather ‘history is a tree without a trunk’.
- 2 *a revised model of structural change (evolution)*—archaeological landscapes are less the locus of adaptive evolutionary behaviour, or the cumulative layered palimpsest of the text metaphor, but rather a discontinuous space within which social action is negotiated. We can speak of the bifurcation history of the landscape.
- 3 *a revised model of causality is implied*—large effects are not necessarily the result of large causes; infinitesimally small and/or insignificant events can generate major transformation.

- 4 *a revised model of time*—teleological determinism is undermined as fictional; the reality is a multiplicity of social and natural temporalities characterized by differential turnover rates or *intrinsic times*; individual components of a larger landscape system may behave in dramatically different ways within distinct time intervals.
- 5 *the possibility of multiple evolutionary pathways*—non-linearity stresses the notion that there is no ‘past’, only culturally mediated interpretations of ‘pasts’ and these must be viewed as the product of bifurcation history.

At a fundamental level, what these points emphasize is that the role of nonlinear dynamics in structuring time and space and hence societal organization demands the construction of a new archaeological ontology—one in which self-organization, bifurcation dynamics and chaotic evolution are viewed as core concepts in the evolution of social—natural systems. The integration of these concepts within a new model of archaeological praxis is a primary challenge for the future of the discipline.

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## NOTES

- 1 The relationship between ‘long-term’ and ‘short-term’ processes is, of course an arbitrary distinction relative to a particular set of events as well as the observational scale involved.
- 2 During the 1820s in Paris, Guizot’s influential teachings asserted a direct relationship between the terms ‘civilization’ and ‘progress’.
- 3 Saraceno (1993:37) among others has pointed out that one of the specific products of modernism is that ‘paid work loses its connection with the activities of survival and the preservation of life’, i.e. with reproduction. In pre-modern periods reproduction *included* production.
- 4 It is worth noting that this interest has been almost exclusively from the English-speaking archaeological community.
- 5 At the highest level of transformation, bifurcations may be manifest as fundamental changes in perception: for example, it is not implausible that the emergence of modernity represents an anthropological bifurcation generated by the effects of science on philosophical thinking and producing two possible trajectories: one in which humans possess liberty, but are the outcome of chance processes; the other in which humans are part of an overall determined natural plan (Arrechi 1992).
- 6 Current wisdom asserts that human evolution itself is the product of blind chance: the arrival of *Homo sapiens* is nothing more than a contingent detail (e.g. Monod 1972; Dawkins 1986; Gould 1989).

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