CHAPTER 2

Timescales

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Archaeology prides itself on its long timescales. Despite the disadvantages of missing, fragmentary and dispersed evidence, archaeology has the one great advantage of looking at the longest of all *longue durée*, potentially spanning the last six million years. However, as we well know scale is context dependent – nothing is inherently big or small, but only by comparison to something else. Lying behind archaeology's claim to long timescales is an implicit and unexamined set of assumptions concerning what constitutes a general view of duration in other disciplines, which, when compared with archaeology, makes our timescales look big. What we might call short duration disciplines, such as anthropology or sociology, investigate sets of events or take a biographical view spanning a person's life time. History explores a range of timescales, overlapping at the micro end of the scale with anthropology, to the long durations of Braudel as people's relationships with land and sea unfolded over centuries and even millennia. By any of these standards, archaeological timescales appear generous, although of course we cannot compete with the geologists or palaeontologists, even though neither of these is worried about humans and their effects. Of the disciplines concerned with human action the span of millennia and millions of years available to archaeology dwarfs all others, allowing us to pose the big questions of what it means to be human, to get lost in the vastness of time at our disposal or dive into minute details of people's lives where these are preserved.

However, size is not everything, or rather is not one single thing. Here is the key point of our chapter – temporal scales are hard to make easy sense of, being not one thing but many; each set of archaeological evidence contains nested within it a number of different forms of duration and means of measurement. Archaeological interpretation involves shuttling backwards and forwards between different spans and durations of time in a manner that is not straightforward. To look at the inherent complexity of timescales, let us compare the temporal and the spatial, as spatial scales, we would argue, are more intuitively easy to understand than temporal ones. Metaphors used to understand time are often spatial: we feel that the future is in front of us and the past behind (a spatial positioning famously reversed in Maori thought where the past, more visible than the future, is thought to be in front of us – in either case a spatial metaphor is used). We talk of the distant past or the near

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future and hope to take things forward (see Lakoff and Johnson, 1980, 1999). The use of spatial metaphors in dealing with time is comforting, but ultimately misleading, as space can be understood through three dimensions, but time is of a greater complexity, less easy to translate into a fixed number of dimensions. Our argument is that as a discipline embraces longer stretches of human time its workers encounter not so much a larger scale, but a greater complexity of scales, made up of a variety of times hard to harmonize into a single picture. In order to explore this key point let us look a little more at the contrast between spatial and temporal scale.

SPATIAL SCALE AND TEMPORAL SCALE

In order to understand, replicate or simulate past sets of spatial scales, it is necessary to start with an averagely sized human body and place it in a landscape or some form of terrain model. Distance, areas of visibility or feelings of enclosure can then all be judged against an average human body and its general capabilities. The same is also true for human constructions in the landscape: forms of boundaries, field systems or buildings can all be subject to estimates as to the labour time involved in their construction and maintenance, and their effects on human and animal patterns of movement or forms of perception can be judged.

In contrast, there is not one temporal scale, but many and it is not entirely clear what standards we should judge our various measurements of duration against. The obvious point of comparison with which to start is the average human life span. However, such spans vary considerably over time and across a single population. According to the latest Human Development Report (Human Development Report Office, 2003) the world average life expectancy is 67 years, with Japanese women having the best life expectancy at 85 years. Shockingly, although predictably, some contemporary African countries have a life expectancy of half that due to a combination of Aids, famine and, sometimes, war. However, the picture within all countries is variable, with class, gender and ethnicity being responsible for considerable differences. Aboriginal people in Australia have life expectancy more in line with those of the Third World than the rest of Australia, which supports one of the longest-lived of the world's populations with an overall life expectancy of 79 years. Such variability is certain to have occurred in the past – slaves and free citizens of fourth century Athens would have had quite different life expectancies. A single yardstick of comparison is elusive.

The term 'life expectancy' can be used in a more philosophical sense. Western cultures at present attempt to hold death at arm's length, constructing the projects of our lives as if death is not imminent. We do not expect to die before extreme old age and feel cheated if this is not the case. At the age of forty most of us are still planning for a long-term future. Many cultures live with a more ready acknowledgement of death and personal finitude. This is not just because life spans were shorter, but also because the emphasis on an individual and their deeds through life was less marked. Ironically, our emphasis on personal longevity might have cut us off from the long-term elements in human life caused by generational succession and being part of the overall flow of life. We are now becoming aware that prehistoric and early historic groups in Britain orientated themselves on a long term past in order to create their life in the present (Bradley, 2002; Gosden and Lock, 1998), an awareness now slow in coming as we do not feel personally part of a succession of generations that leave marks of their activities all round us. Such feelings of succession are currently displaced onto broader groups – nations, towns or institutions have long-term histories, but individuals and kin groups are less likely to partake in them, despite the current popularity for reconstructing family histories. Consequently, we can see that time has a qualitative dimension, as much as a quantitative one – what people feel about the duration of their lives and how this fits in with lengths of time beyond the individual life spans are crucial to the nature of individual and group projects.

Variability in individual life spans within and between societies is not the major complicating factor in working with time archaeologically. The greater problem is that individuals and groups do not present themselves in a straightforward sense archaeologically. Let us start with a single human body. If we assume an average prehistoric lifespan of some forty years then the application of radiocarbon dating, generally with a minimum period of plus or minus fifty years, will provide a determination with a range longer than the life of the person whose bones can be dated. People cannot be placed in time using absolute methods at a timescale commensurable with the spans of their lives. If we focus in on events and processes occurring within the life of a person, then complexity increases. When looking at diet we can sample bones in which isotopic values depend on the food eaten in the last decade of life. In order to understand human movement, we can sample for strontium and compare the values for the adult teeth, laid down in the few years in which the teeth were grown, with the values for the bones created in the last few years of life. Differences between teeth and bones might indicate movement, but provide us with two snapshots of a whole human biography. The times of the body thus vary and are difficult to fix. We cannot reconstruct a whole human biography, but can gain brief flashes of insight into people's histories. These individual flashes start to make some sense when a large enough sample is gained of human individuals, from which broader patterns can be discerned. But it must be remembered that these broader patterns are dependent on individual instances and structured by these.

It is even more difficult to connect people to their products. A hand axe or a pot might take a few hours each to produce, with each individual step of production taking seconds or minutes. Objects might be used and immediately discarded, or curated and used for many hundreds or thousands of years, an ultimate instance of which is the display of handaxes in Roman temples, or indeed the recovery of long-buried materials through excavation. The total biography of an object in production and use might either be much shorter or much longer than an individual life span, only occasionally approximating it (these are the truly biographical objects that people have carried for much of their lives, accruing the significance of their lives – Hoskins, 1998). As Chapman (2000) reminds us, some things were made to be broken and deposited, others to be kept and curated. The treatment of artefacts can give us vital clues as to the cultural forces at work in creating groups and individuals. Artefacts have their own longer temporal rhythms, so that changes in style can be described by battleship curves, as styles wax and wane over periods more or less than a human life span. In many cases different classes of materials, for instance pottery and metalwork in Britain from the Bronze Age onwards, have their own separate histories. A chronology for metalwork is hard to tie to that for pottery; and it is harder to link the history of settlements with metals as most metal is in cemeteries or hoards, whereas pottery is crucial for the dating of settlements.

The nature of the archaeological evidence is generated through a series of timescales, from a single event, such as knapping, to palimpsests of material that may build up very slowly over centuries and millennia through a complex combination of human and natural factors. There is no one single temporal landscape, as our understanding of time is made up of many forms of evidence, each with their own influences and biases. A useful analogy is the contrast between perspectival painting and Cubism. Constable's *The Hay Wain* depicts a bucolic English landscape at a human scale, complete with buildings, human figures and the hay wain itself as comforting reference points. The paintings of Picasso's Cubist period are much harder to assimilate, precisely because they introduce the temporal dimension of human experience to explore what an object looks like when the various angles from which it can be seen are rendered in two dimensions. Archaeological time necessitates a Cubist form of reconstruction in which various measures and qualities of time intersect in ways that do not always make immediate sense. Scale is not a strong quality of Cubist painting and in the same way timescales in archaeology are hard to judge due to their internal complexity.

In order to develop and elaborate these points we will look at a number of sites and case studies each with their own complexity of timescales and problems of combining long timescales with short-term events and processes. The contrast between long and the short come out most clearly with Palaeolithic sites, so that we will start with the famous British site of Boxgrove.

BOXGROVE

The Lower Palaeolithic calcareous silts of Boxgrove in West Sussex have preserved an extensive archaeological landscape, including a human tibia and associated stone tools believed to date to approximately 500,000 years ago (Roberts et al., 1994:311). The site also contains evidence for butchery and possible large-game hunting (Roberts and Parfitt, 1999:415).

As Clive Gamble notes, ‘‘the Boxgrove landscape vividly records a series of brief activities, maybe as little as 15 minutes each, that took place 500,000 years ago on a beach in southern England’’ (Gamble, 1994:275). Boxgrove contrasts the minute temporal scale of everyday activities such as flint-knapping and carcass processing with larger-scale questions such as the timing of the earliest human colonization of Europe.

Boxgrove also poses important questions about the most fruitful applications of stratigraphic and radiometric dating techniques. Because of the site's great antiquity, relative dating techniques with real temporal depth, such as biostratigraphy, have been crucial to dating efforts. The vole clock – the evolutionary change from rooted molar dentition of *Mimomys savini* to the unrooted molars of the extant *Arvicola terrestris* – is the key element around which much of the Boxgrove chronology has been constructed, and occurred shortly before the Boxgrove site was formed (Roberts et al., 1994:312). The artifact-bearing silts at Boxgrove have been dated by mammalian biostratigraphy to a temperate stage immediately preceding the Anglian glaciation (Roberts and Parfitt, 1999:307). Correlative biostratigraphy, combined with geomorphological evidence from fluvial gravels, points to a date in oxygen isotope stage 13 (OIS 13), between 524,000 and 478,000 years ago (Roberts et al., 1994:312).

These dates are controversial. Other researchers have pointed out that inter-site biostratigraphic comparisons are not securely underpinned by independent physical-chemical dating, and that the dating argument based on fluvial gravels is not unambiguous (Bowen and Sykes, 1994:751). Indeed, chemical and radiometric methods have been generally unsuccessful at Boxgrove, producing dates ranging from OIS 6 to OIS 13 (Roberts and Parfitt, 1999). Most of the scientific methods produced later dates that the biostratigraphic estimates: Electron Spin Resonance (ESR) and Uranium series results suggested a date in OIS 7 (245,000 years ago), and aminostratigraphic results support a date in OIS 11, 423,000–362,000 years ago (ibid:303). Optically Stimulated Luminescence (OSL) dating supports the OIS 13 date, but an OIS 11 date is within one standard deviation of the OSL age estimate, so the dating is not unquestionable (McNabb, 2000:440).

Boxgrove raises the difficulties of reconciling long and short elements of dating. One the one hand are the things of ultimate interest – hominid activity at a very early point in the hominid occupation of Britain, in this case flint knapping and animal butchery. These are faithfully recorded in high resolution by the Boxgrove palaeosurfaces, due to the suddenness of burial. They are also well-recorded through high-quality excavation. On the other hand, there is the overall uncertainty about which oxygen isotope stage Boxgrove should fall into. A key element of the Boxgrove evidence is a strong indication that hunting was taking place. The origins of hunting, an activity which takes considerable social coordination, as well as technical expertize, has been much debated, with many feeling that true hunting may not occur prior to the Upper Palaeolithic, some 40,000 years ago. The combination of the comparatively instantaneous activities of knapping and butchery at Boxgrove, and the uncertainty about placing the site in time makes the temporal situation of Boxgrove complicated and hard to evaluate.

POUNDBURY

The case of Poundbury, a site in Dorchester in southern England, illustrates the different degrees of temporal resolution provided by both different materials and investigative methods. Poundbury comprises a settlement with occupational phases beginning in the Neolithic and continuing to the post-Medieval era associated with a series of cemeteries from which over 1,400 inhumations have been recovered

(Farwell and Molleson, 1993:ix). The earliest evidence for burials occurs in the Middle Bronze Age, and the latest securely-assigned burials appear to be associated with the Late Roman period (1993:xii). The Iron Age and Roman phases at Poundbury are particularly interesting because one can attempt to trace the development of the cemetery and settlement together through time. Fifty-nine burials derive from the late Iron Age and early Roman periods and 1114 graves were associated with the late Roman period (4th century BC). Diachronic change in architecture, artifacts, and even skeletal form can be observed in a long-lived settlement such as Poundbury, especially given the sample sizes available.

Both radiocarbon and artefactual dating were employed in order to untangle the complex stratigraphy encountered in many of the phases of the site, especially in trying to relate the constructional phases in each complex to the overall site chronology (Sparey-Green, 1987:91). Spatial scale was intimately related to temporal scale at Poundbury: most of the dating was accomplished through artefact typology and stratigraphic and proximal association. Radiocarbon dating was applied to several phases of the settlement, and the dates obtained span from the 15th century BC to the 5th century AD (1987:141).

Radiocarbon and artefactual dating were important at Poundbury as part of efforts to understand the physical development of a non-living entity – the site itself – and to trace the evolution of lifeways at the settlement. A different sort of resolution is provided by stable isotope analysis performed on skeletons from the Iron Age to post-Roman eras, which illuminated the social scales and scales of migration in operation during this period, along with variations in diet through time. Isotopic analysis of individual remains illuminated differences in diet corresponding to inferred variations in social status within a population, variations in diet between the populations of different periods, and dietary differences between Poundbury natives and possible immigrants from a warmer clime (Richards et al., 1998:1251). The late Iron Age and early Roman period skeletons show that most people had a similar diet, with meat and vegetables but no marine foods. In the late Roman period people buried in more elaborate graves, with lead coffins or mausolea ate more animal protein than those in poorer graves and some immigrants were picked out by variations in bone chemistry related both to the foods making up the diet and geological substrates on which food had been grown.

Poundbury provides us with a mix of chronological perspectives, which it is possible to enter at different scales depending upon interest. A single human biography may be discerned from bone isotopes or more general and longer-term trends may be seen. The artefacts in the graves and the forms of the graves themselves respond to long-term trends, many of which emanate from outside the region, through influences flowing through the Roman Empire more broadly. A single grave may represent a compound of longer term changes in material culture, with evidence from a human body personal to the individual concerned and this later bodily information may have been laid down at a variety of times, from childhood to the last few years of life, depending on whether bones or teeth were being sampled. Such complexity within an individual is found in even greater measure on those rare occasions when tissues and hair are preserved – one much discussed case being Ötzi, the Iceman.

ÖTZTAL

The Ötztal iceman was discovered by a pair of hikers in 1991 on the Italian side of the Ötztal Alps, near the Austrian border (Kutschera and Rom, 2000:13). The Ötztal case represents a reversal of the Poundbury scenario, where artefactual dating based on a well-known regional typology sequence produced a finer degree of temporal resolution than scientific methods. Here, radiocarbon and stable isotopes provide information on Ötzi's position within a worldwide radiocarbon chronology and movements through the region during his lifetime.

Prehistorians initially dated the extraordinarily well-preserved remains to around 2000 BC on the basis of the flanged axe in the Iceman's kit, an artifact characteristic of the Early Bronze Age in the northern Alps (Barfield, 1994:20). However, radiocarbon determinations produced even earlier dates. AMS radiocarbon measurements on tissue, bone, equipment, and grass from the Iceman assemblage produced an (averaged) radiocarbon age of 4,550 $\pm$ 19 BP indicating that the Iceman lived in the Late Neolithic, between 3370 and 3100 BC (Bonani et al., 1994, Kutschera and Rom, 2003:709), in contrast to the Early Bronze Age date suggested by the artefactual evidence. Further investigation into the stylistic chronology of the region was conducted in order to reconcile this discrepancy, and a possible correlation of the axe from Ötzi's kit with another early instance of the flanged axe form in the greater region may have resolved the disagreement between the artefactual and radiocarbon age estimates (Barfield, 1994:22).

The intimate connection between spatial and temporal scales is illustrated by the investigation of Ötzi's origin and movements through isotopic analysis of different body tissues representing different developmental stages (Kutschera and Rom, 2003; Holden, 2003). A combination of radiogenic (Sr, Pb, Nd) and stable (O, C, N) isotopes were measured in order to investigate different aspects of the Iceman's prehistoric movements. The heavy radiogenic isotopes enable the reconstruction of movement relative to the local geological substrate, while the lighter stable isotopes track changes in palaeodiet (C and N) and altitude and position relative to a watershed (O) (2003:715). Argon dating was performed on ingested mica samples from the Iceman's intestine in order to determine their provenance from among local lithologies of different geological ages (Müller et al., 2003:865).

Different lithological units have different isotopic compositions, and these differences are preserved in the vegetation and fauna of each geological region. Human hard tissues such as bone and tooth enamel mineralize at different developmental stages and incorporate radiogenic isotopes bearing the signature of their geological environment during each ontogenetic stage. The enamel of the permanent dentition mineralizes in early childhood and remains compositionally unaltered thereafter, while bones are continually re-mineralizing throughout an individual's lifetime. The isotopic composition of bone reflects the last 10 or so years of life, with spongy bone turning over more rapidly than cortical bone (Sealy et al., 1995).

Strontium and lead ratios from Ötzi's tooth enamel were significantly different from ratios from spongy and cortical bone samples, indicating that the region in which the Iceman was an adult was geologically distinct from that of his childhood. Analysis of oxygen isotope ratios indicated a southerly origin for the Iceman, and

Sr and Pb ratios pointed to the region within 60 km south of the find site (Kutschera and Rom, 2003:718). Investigators also noted the possibility that the Sr and $\delta^{18}O$ isotope values observed in the Iceman reflect a pattern of seasonal migration between low altitude settlements in the south and summer grazing areas above the timberline in the north, around southern Ötztal (Müller et al., 2003:865).

So for Ötzi, isotopic analysis of dental enamel zooms in to the third to fifth years of his life, analysis of bone describes the last 10–20 years, his kit attests to the demands of his final days, and the ingested mica in his intestine reflects his last hours. Because of the unusual preservation of tissue, stomach contents and artefacts, Ötzi highlights how complex the temporality surrounding an individual can be. Any person represents a point of intersection of varying temporal scales. For Ötzi there is the biography of his life – his origin lies some 60 km south of where he died. The movement between place of birth and death may be something accidental to him or reflect broader patterns of movement – which possibility pertains, we do not know. The same goes for his diet, over which there is considerable controversy, particularly in the comparison between stomach contents revealing his last meal and analyses of his hair, which grew over a longer period. It seems most likely that he ate a mixed diet of meat, bread and vegetable matter, totally unsurprisingly, and each component of this reflects long histories of domestication and local knowledge vital for procurement. One of the most intriguing features of the Iceman find is the presence of a suite of equipment and clothing representing the kit of one person at a particular point in time. These artefacts have not gone through a post-mortem selection process, and so more accurately represent a certain moment within the Iceman's lifetime, a moment primarily concerned with survival in the mountainous terrain of the Alps (Barfield, 1994:12). The material culture found with the body, such as the bows, copper axe, a backpack, and birch bark containers demonstrate that 18 different sorts of woods were used, each presumably chosen for its properties being suitable to the object being made. Such knowledge was not individual to Ötzi, but the product of long traditions of working in the mountains and Alpine valleys. The birchbark containers, backpack, and bows were specific instances of broader assemblages of material originally found in large numbers at the very end of the Neolithic, most of which perished long ago.

DISCUSSION

Absolute methods provide a global scale, so that a site, landscape or assemblage of material can be placed within a set of chronological schemes that can ultimately span the globe. Thus, Boxgrove is of interest globally, feeding into debates about human ancestral capabilities, especially to do with hunting from periods when evidence is sparse anywhere in the world. The Boxgrove finds excited much British interest, but again because it put Britain on a larger map. *The Times* famously described the find of a human tibia at Boxgrove as evidence of the ''first European'' (a phrase replete with temporal confusions, Europe being a very recent category and having little utility in describing the identity of hominids living so long ago, and also factually incorrect, there being a number of older sites within the territory of present day Europe). It is the scale of discussions and consideration that is crucial to people's views of dating evidence. Ötzi is known and discussed globally due to the unusual nature of preservation and the evidence, but the artefactual assemblages and more detailed pattern of actions are of great interest to local prehistorians, as well as to the world community. Poundbury is of somewhat more local interest, but the evidence is again a compound of varying sets of scales among individuals buried and the complex of evidence from the site more generally.

Time and timescales can only be understood through metaphor – long timescales, the deep past and so on – rather than directly. This being so we need to think more about the range of metaphors we employ and their internal compatibility. In addition to the spatial metaphors used to understand time, which are deeply engrained in our thought and will obviously continue in use, we can see that there are also discursive effects on our conception of time, although here again the scope of discussions are often influenced spatially. Boxgrove is a site most immediately thought of in a larger ambit – whether hominids were in Britain 500,000 years ago tells us something about the pulses of populations across the continent of Europe and beyond, as does whether Britain was only occupied in warmer climatic or during cold ones as well. Even the short-term evidence of killing, knapping and butchery are best thought of broadly, once we have got over that amazing preservation and degree of detail from a site of this age. The Iceman again commands headlines due to the nature of his preservation, but ultimately there is a surprisingly local story being told here based on considerable geological variability expressed in the various isotopic values in tissue, hair, teeth and bone. The objects found with him also tell of a fine knowledge of the local region and its resources. People living near to Boxgrove might be excited that such an amazing find lies in their vicinity, if they think about the matter at all, but it tells them little about the use of the local region. Ötzi is globally known and discussed, but the evidence derived from his body and artefacts fit directly into local knowledge and feel for the varying altitudinal zones, their plants and animals, that still exists in the region today. Poundbury's story can be entered at different temporal levels, ranging from the long-term coming into being of a single place in use from the Neolithic to the medieval period and beyond; it informs on the nature of diet and movement in the Iron Age and Roman periods that specialists of both periods can relate to and discuss in terms of the histories of artefacts and of human bodies.

Time excites a range of reactions in us all. Even the hardened professional gains a sense of wonder from a knapping episode perfectly preserved from half a million years ago, or from a single person and his equipment from 5,000 years ago. Once this sense of wonder has diminished, more pragmatic, analytical concerns set in arising from what one can say about evidence of this type and how to place it within a broader narrative of long term trends and changes. The pinpoint nature of events that first excite attention, become part of an analytical problem of how to fit rich short-term elements of evidence within a longer, thinner record from which so much has been lost. If all our evidence was as rich as that surrounding Ötzi we would quickly become overwhelmed in detail and our ability to see long-term trends would be lost, but this is not a great fear, faced as we are with the opposite problem.

Understanding time and timescales is a complex business. Complexity is not something to be dissolved or disaggregated into simpler forms. Almost any piece of archaeological evidence mixes longer and shorter times within it and can appeal to varying sets of discussion of local or more global significance. We do need to be aware of the complex nature of our temporal evidence and think how we can use this. The radiocarbon revolution (and subsequent advances in absolute dating) have taken some of the worry out of chronology, in that many sites can be placed in a scheme of ultimately global scope, with determinations also very helpful in creating internal sequences within sites. Placing sites in some measurable scale creates confidence, culturally inclined as we are to see time as measurement in our daily lives. But radiocarbon determinations bring us up against events that happened so quickly (such as an individual lifespan) that they cannot be placed within timescales deriving from absolute dating methods. Rather than seeing temporal complexity and a lack of a single timescale as a problem, we can use this as a spur to reflect on the fact that time is a quality as much as a quantity – some minutes or hours fly by and others drag on interminably. Most of the minutes and hours have vanished from our evidence, but some are still there and how to bring these together with years, decades, centuries and millennia is still a key issue for archaeology, which needs to be more clearly recognized than it has to date.

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http://www.springer.com/978-0-387-32772-3

Confronting Scale in Archaeology
Issues of Theory and Practice
Lock, G.; Molyneaux, B. (Eds.)
2006, XIV, 280 p., Hardcover
ISBN: 978-0-387-32772-3