

# 12

## Why Did Things Change? Explanation in Archaeology

To answer the question “why?” is the most difficult task in archaeology. Indeed, it is the most challenging and interesting task in any science or field of knowledge. For with this question we go beyond the mere appearance of things, and on to a level of analysis that seeks in some way to *understand* the pattern of events. Yet this is the goal motivating many who take up the study of the human past, whether we are speaking of archaeology or of history more generally. There is a desire to learn something from a study of what is dead and gone that is relevant for the conduct of our own lives and those of our contemporaries today. Archaeology, which allows us to study early and remote prehistoric periods as well as the more recent historical ones, is unique among the human sciences in offering a considerable time depth. Thus, if there are patterns to be found among human affairs, the archaeological timescale may reveal them.

The eminent French historian Fernand Braudel distinguished three levels of historical events, and of historical analysis. At the surface, so to speak, are the specific occurrences of human history: *l'histoire événementielle*, as he termed it. Beneath these superficial happenings lie slower rhythms, including the cycles identified by economists with a periodicity measured perhaps in decades. Finally, beneath these rhythms are the basic, long-term trends, the *longue durée*, which usually prevail in the end.

That is only one man's view. Even so, it hints at the complexity of trying to explain history. Indeed, there is no agreed and accepted way of setting out to understand the human past. A chapter such as this is therefore bound to be inconclusive, and certain to be controversial. Yet it is a chapter worth writing and worth thinking about, for it is in this area of inquiry that archaeological research is now most active.

The past 30 years have seen the re-emergence of the use of archaeological theory. For several decades, the whole subject of explanation was in the doldrums. However, with the development of the New Archaeology in the 1960s, and the accompanying “loss of inno-

cence,” came the realization that there was no well-established body of theory to underpin current methods of archaeological inquiry. To a large extent this is still true, although there have been many attempts sparked off by the processual approach of the New Archaeology to provide an underlying body of theory. Today there is a superabundance of approaches to explaining “why?” The archaeological literature is awash with polemical discussions between positivists, Marxists, structuralists, postprocessualists (see box, pp. 42–43), etc., all claiming some special insight.

The early New Archaeology involved the explicit use of theory and of models, and above all of generalization. Subsequently, it was criticized as too “functionalist,” too much concerned with ecological aspects of adaptation and with efficiency, and with the purely utilitarian and functional aspects of living. Meanwhile, an alternative perspective, inspired by Marxism, was laying more stress on social relations and the exercise of power. Nevertheless, the processual and Marxist approaches have much in common: they are compatible, as we shall see below, even though they use rather different terminologies (some would say jargons) to express their views.

From the 1970s, in reaction to the processual “functionalists,” a structuralist archaeology was proclaimed, then a post-structuralist, and, finally, a postprocessual one. These performed a useful service in stressing that the ideas and beliefs of past societies should no longer be overlooked in archaeological explanation.

In the 1980s, several of the practitioners of processual archaeology sought ways of dealing with the cognitive aspects of past societies in the framework of processual thinking. This “cognitive-processual” approach seeks to enlarge the scope of the now-traditional processual archaeology by stressing social and cognitive aspects, yet without rejecting the value of earlier work. It opens the way, using the theoretical approach known as “methodological individualism,” to consider more carefully the place of agency, i.e. the actions of individuals, in processes of change (see box,

pp. 492–93). The significant role of the individual has been one of the points stressed by postprocessual archaeologists (especially those advocating “structuration theory”) and one can now see some convergence here between the two approaches. We shall therefore discuss approaches to the explanation of the past in these terms, fully realizing that, when so many different schools of thought are in existence, no complete consensus is possible. “Why” questions are significant ones, but the answers depend to a large extent on one’s perceptions and preconceptions. In emphasizing the variety displayed in current approaches towards explanation in archaeology, we are perhaps revealing one of contemporary archaeology’s greatest strengths – that it is as exciting at the intellectual level as it is rich in its subject material.

### **What Are We Trying to Explain?**

Many of the current debates about archaeological explanation fail to notice that different workers are explaining different things. Pronouncements about valid methods frequently appear contradictory, yet the contradiction may disappear when we realize the vast differences between the individual cases. For instance, an archaeologist seeking to explain the distribution of humankind during the last Ice Age, using timescales that are accurate only to within a few thousand years, will often lean more heavily on climatic and vegetational factors than on other aspects of community affairs. Such explanations at first sight lay themselves open to charges of “ecological determinism” – that changes in the environment automatically determine changes in human society. Certainly, a research worker studying the designs on glazed tile floors of the Middle Ages would propose explanations far removed from the world of Paleolithic hunter-gatherers.

First, therefore, let us distinguish between some of the different things we may be trying to explain: they may, in fact, require different kinds of explanation.

**Explaining Specific Conditions of Burial and Preservation.** Our concern with a particular find or site may be with the essentially natural processes that have resulted in burial and preservation. These are the kind of processes that the American archaeologist Michael Schiffer has called “N-transforms” (i.e. the work of natural processes) to distinguish them from “C-transforms” (the work of culturally determined processes resulting from human actions) (see Chapter 2). The types of question one might be trying to answer are: How did these animal bones come to be buried with those tools? Why are these textiles so well preserved?

**Explaining a Specific Event.** Our concern may be to explain why a specific event took place. The philosopher of history R.G. Collingwood used to ask, “Why did Caesar cross the Rubicon?” Archaeology is less often concerned with events in the lives of named individuals, but it will still ask such specific questions as, “What caused the Classic Maya collapse?” or “Why was the Second City at Troy destroyed when it was?” And the answer may well involve the actions and thoughts of individuals, although these are likely to be generic individuals, not those whom we can name or identify from the archaeological record as separate and recognizable people.

**Explaining a Specific Pattern of Events.** Often, the archaeologist perceives some pattern in the archaeological record, and it is this pattern rather than a single, specific occurrence that seems to require explanation. A good example is offered by the “elm decline” in Neolithic Europe. Pollen sequences in much of northern Europe show that the percentage of elm pollen declined markedly, although the absolute date for the decline is not the same in each area. Why was this? Is the explanation climatic change? Did some pest attack the trees? Or was there a change in the pattern of exploitation by humans? The answer may not yet be clear: what is clear is that there is a pattern in need of explanation. (For a possible explanation of the elm decline, refer to Chapter 6.)

**Explaining a Class of Events.** Generalization, as we shall see, is still rare in archaeology. Yet some of the most interesting explanations of change concern not just one event or pattern of events, but a whole, more general class of events. For instance, we might regard the development of food production in the Near East at the end of the last Ice Age as constituting a pattern of change over a wide area. We might say the same of the development of food production in Mesoamerica. When we compare the two, and then bring into consideration the inception of food production in China and in Southeast Asia, and then in sub-Saharan Africa, we are dealing with phenomena that may be unconnected. Yet it is remarkable that food production seems to have begun in all these areas within a relatively short timespan in the post-Pleistocene period. Why? Here, then, is a class of events that demands an explanation. (For one proposed explanation, see box, p. 472.)

Another example is the emergence of state societies – of cities and “civilization” – in different parts of the world, when some of these areas were apparently not in significant contact with each other. How do we explain such a phenomenon?

The issue of the rise of complex society is one of the most actively debated in contemporary archaeology and is discussed further below. Another example, the phenomenon of system collapse in early state societies, is likewise looked at in some detail later in the chapter.

**Explaining a Process.** In some cases, the problem is not to explain a given event or pattern or even a class of events. Instead, insight may be sought into processes at work in society of a continuous and long-enduring nature. The phenomenon of the intensification of agri-

cultural production may be of this kind, or the development of ranked society. These processes may be seen as something common to large parts of humankind, at least under certain conditions. To explain such processes may by no means be an easy task, but their understanding must be one of the essential goals of archaeological and anthropological research.

There are many different kinds of explanation on offer. Some are more suitable for one of these types of problem than for others. This needs bearing in mind.

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## MIGRATIONIST AND DIFFUSIONIST EXPLANATIONS

The New Archaeology made the shortcomings of traditional archaeological explanations much more apparent. These shortcomings can be made clearer in an example of the traditional method – the appearance of a new kind of pottery in a given area and period, the pottery being distinguished by shapes not previously recognized and by new decorative motifs. The traditional approach, in its own way a systematic one, will very properly require a closer definition of this pottery style in space and time. The archaeologist will be expected to draw a distribution map of its occurrence, and also to establish its place in the stratigraphic sequence at the sites where it occurs. The next step is to assign it to its place within an archaeological *culture*, defined (following Gordon Childe) as a “constantly recurring assemblage of artifacts.” The pottery may itself be one of its most conspicuous features, but there will be others with which it is associated.

Using the traditional approach, it is argued that each archaeological culture is the manifestation in material terms of a specific *people* – that is, a well-defined ethnic group, detectable by the archaeologist by the method just outlined. This is an ethnic classification, but of course the “people,” being prehistoric, have to be given an arbitrary name. Usually, they will be named after the place where the pottery was first recognized (e.g. the Mimbres people in the American Southwest or the Windmill Hill people in Neolithic Britain), or sometimes after the pottery itself (e.g. the Beaker Folk).

Next it is usual to see if it is possible to think in terms of a folk *migration* to explain the changes observed. Can we locate a convenient homeland for this group of people? Careful study of the ceramic assemblages in adjoining lands may suggest such a homeland, and perhaps even a migration route.

Alternatively, if the migration argument does not seem to work, a fourth approach is to look for specific features of the cultural assemblage that have *parallels*

in more distant lands. If the whole assemblage cannot be ascribed to an external source, there may be specific features of it that can. Links may be found with more civilized lands. If such “parallels” can be discovered, the traditionalist would argue that these were the points of origin, of departure as it were, for the features in our assemblage, and were transmitted to it by a process of cultural *diffusion*. Indeed, before the advent of radiocarbon dating, these parallels could also be used to date the pottery finds in our hypothetical example, because the features and traits lying closer to the heartlands of civilization would almost certainly already be dated through comparison with the historical chronology of that civilization. The occurrences of these traits may offer a *chronological horizon*, which is of great use in dating the culture.

It would be easy to find many actual examples of such explanations. For instance, in the New World, the very striking developments in architecture and other crafts in Chaco Canyon in New Mexico, and with it Mesa Verde in Colorado, have been explained by comparisons of precisely this kind with the more “advanced” civilizations of Mexico to the south. Similarly, for a long time archaeologists in what is now Zimbabwe attempted misguidedly to explain the great stone monuments at the site of Great Zimbabwe in this way, by saying they were built by foreigners, not by the indigenous Shona people (see box overleaf).

Traditional explanations rest, however, on assumptions that are easily challenged today. First, there is the notion among traditionalists that archaeological “cultures” can somehow represent real entities rather than merely the classificatory terms devised for the convenience of the scholar. Second is the view that ethnic units or “peoples” can be recognized from the archaeological record by equation with these notional cultures. It is in fact clear that ethnic groups do not always stand out clearly in archaeological remains (the point

## **DIFFUSIONIST EXPLANATION REJECTED: GREAT ZIMBABWE**

The remarkable monument of Great Zimbabwe, near Masvingo in modern Zimbabwe, has been the object of intense speculation ever since this region of Africa was first explored by Europeans in the 19th century. For here was an impressive structure of great sophistication, with beautifully finished stonework.

Early scholars followed the traditional pattern of explanation in ascribing Great Zimbabwe to architects and builders from “more civilized” lands to the north. On a visit to the site by the British explorer Cecil Rhodes, the local Karange chiefs were told that “the Great Master” had come “to see the ancient temple which once upon a time belonged to white men.” One writer in 1896 took the view that Great Zimbabwe was Phoenician in origin.

The first excavator, J.T. Bent, tried to establish parallels – points of similarity – between the finds and features found in more sophisticated contexts in the

Near East. He concluded: “The ruins and the things in them are not in any way connected with any known African race,” and he located the builders in the Arabian peninsula. This was thus a migrationist view.

Much more systematic excavations were undertaken by Gertrude Caton-Thompson (p. 36), and she concluded her report in 1931: “Examination of all the existing evidence, gathered from every quarter, still can produce not one single item that is not in accordance with the claim of Bantu origin and medieval date.” Despite her carefully documented conclusions, however, other archaeologists continued to follow the typical pattern of diffusionist explanation in speaking of “influences” from “higher centers of culture.” Portuguese traders were one favored source of inspiration. But if the date of the monument was to be set earlier than European travelers, then Arab merchants in the Indian Ocean offered

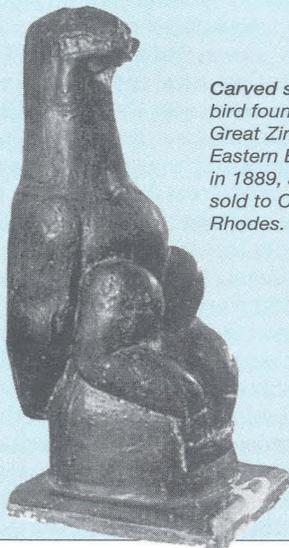


an alternative. As late as 1971, R. Summers could write, using a familiar diffusionist argument: “It is not unduly stretching probability to suggest some Portuguese stonemason may have reached Zimbabwe and entered the service of the great chief living there.... Equally probably, although rather less plausible, is that some travelling Arab craftsman may have been responsible.”

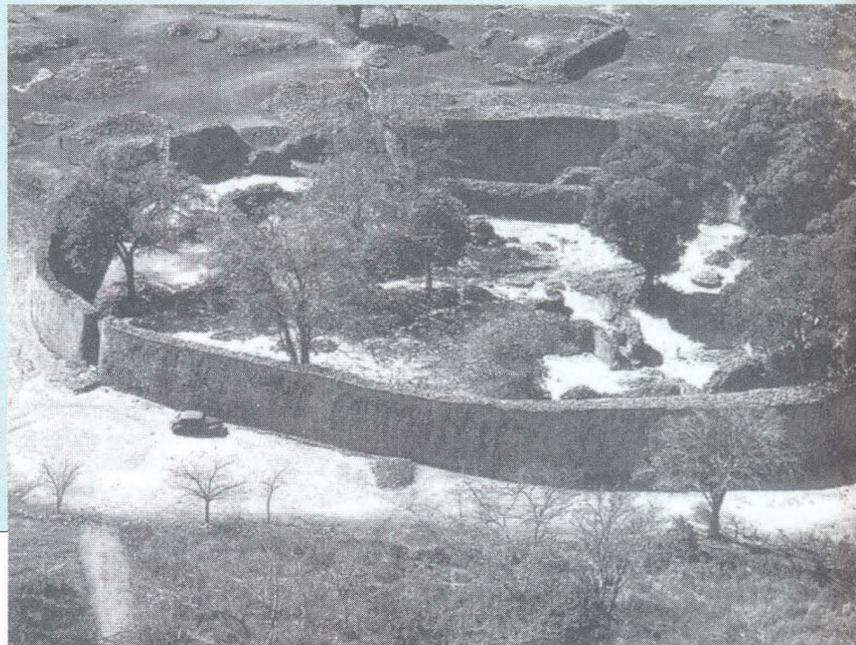
Subsequent research has backed up the conclusions of Gertrude Caton-Thompson. Great Zimbabwe is now seen as the most notable of a larger class of monuments in this area.

Although the site has an earlier history, the construction of a monumental building probably began there in the 13th century AD, and the site reached its climax in the 15th century. Various archaeologists have now been able to give a coherent picture of the economic and social conditions in the area that made this great achievement possible. Significant influence – diffusion – from more “advanced” areas is no longer part of that picture. Today a processual framework of explanation has replaced the diffusionist one.

*An aerial view of the Elliptical Building.*



*Carved soapstone bird found in the Great Zimbabwe Eastern Enclosure in 1889, and later sold to Cecil Rhodes.*

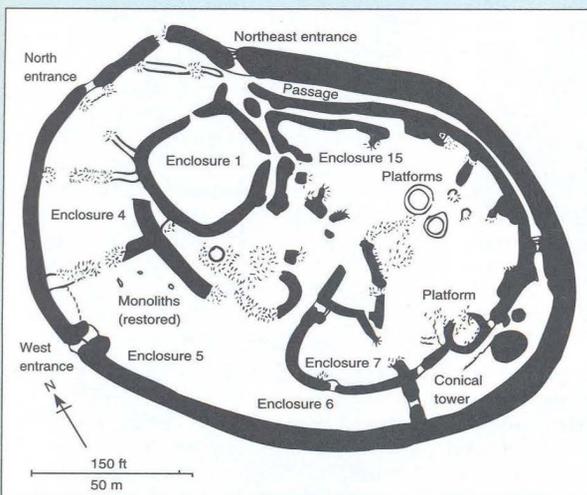


# THE RIDDLE OF RHODESIA



*Racism and archaeology: a subservient black slave presents his offering of gold to a ghostly Queen of Sheba in this Rhodesian government poster of 1938.*

*Site plan: the Elliptical Building, with its series of enclosed areas, platforms, and the conical tower displayed in the poster (shown above).*



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is discussed further in the box, Ancient Ethnicity and Language, p. 189). Third, it is assumed that when resemblances are noted between the cultural assemblages of one area and another, this can be most readily explained as the result of a migration of people. Of course, migrations did indeed occur (see below), but they are not so easy to document archaeologically as has often been supposed.

Finally, there is the principle of explanation through the diffusion of culture. Today, it is felt that this explanation has sometimes been overplayed, and nearly always oversimplified. For although contact between areas, not least through trade, can be of great significance for the developments in each area, the effects of this contact have to be considered in detail: explanation simply in terms of diffusion is not enough.

Nevertheless it is worth emphasizing that migrations did take place in the past, and on rare occasions this can be documented archaeologically. The colonization of the Polynesian islands in the Pacific offers one example. A complex of finds – especially pottery with incised decoration – known as the Lapita culture provides a record of the rapid movement of islanders eastward across a vast uninhabited area, from the northern New Guinea region to as far as Samoa, between 1600 and 1000 BC (see overleaf). Also, innovations are frequently made in one place and adopted in neighboring areas, and it is still perfectly proper to speak of the mechanism as one of diffusion (see illustration of the origins of the Roman alphabet overleaf).

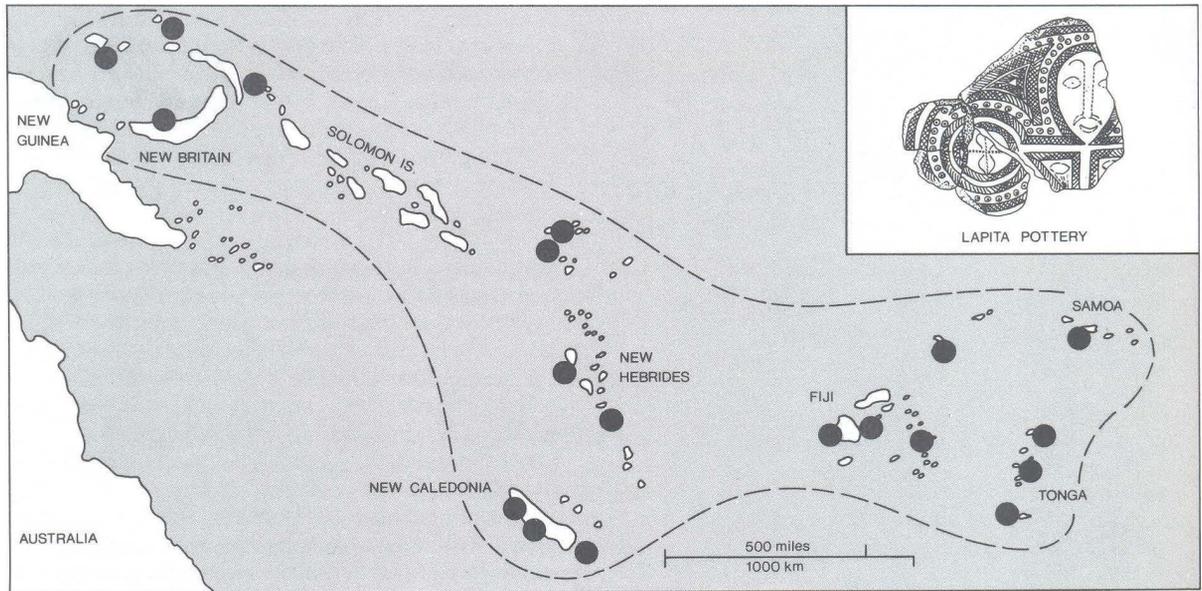
## THE PROCESSUAL APPROACH

The processual approach attempts to isolate and study the different processes at work within a society, and between societies, placing emphasis on relations with the environment, on subsistence and the economy, on social relations within the society, on the impact which the prevailing ideology and belief system have on these things, and on the effects of the interactions taking place between the different social units.

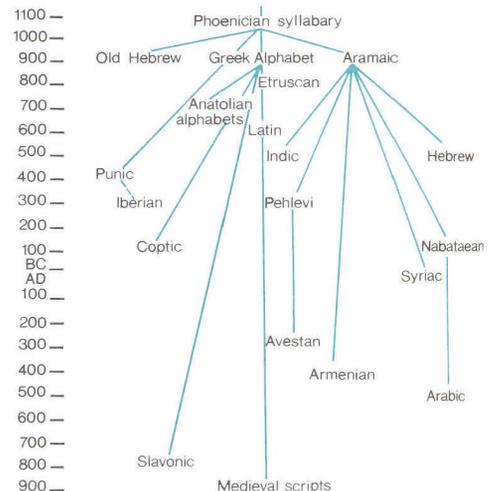
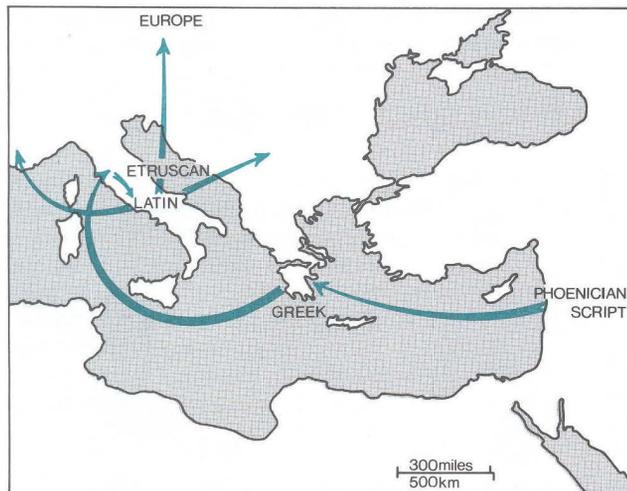
In 1967, Kent Flannery summed up the processual approach to change as follows:

Members of the process school view human behavior as a point of overlap (or “articulation”) between a vast number of systems each of which encompasses both cultural and non-cultural phenomena – often much more of the latter. An Indian group, for example, may participate in a system in which maize is grown on a river floodplain that is slowly being eroded, causing the zone of the best farmland

**PART II Discovering the Variety of Human Experience**



*Migration: a positive example. The question of first settlement of the Polynesian islands has apparently been resolved by the discovery of a finds complex known as the Lapita culture, characterized in particular by pottery with incised decoration. Lapita sites were small villages, often with evidence of permanent occupation. They provide a record of the rapid movement of islanders by boat, eastwards from the northern New Guinea region to as far as Samoa in western Polynesia, between 1600 and 1000 bc according to radiocarbon dating. It is generally accepted that the Lapita migrants were the ancestors of the Polynesians, while those (the majority) who remained in Melanesia formed a large part of the ancestry of the present island Melaneseans.*



*Diffusion: a positive example. One instance where an innovation in one place is known to have spread widely elsewhere through diffusion is that of the alphabet. Around the 12th century bc, on the Levantine coast, the Phoenicians developed a simplified phonetic script to write their Semitic language (a script now believed to derive ultimately from Egyptian hieroglyphic). By the early 1st millennium bc, the script had been adapted by the Greeks to write their language. This ultimately formed the basis for the Roman alphabet used today. (The Phoenician script also gave rise to the Hebrew, Arabic, and many other alphabets.) But of course the Greek alphabet had first to be modified and adopted in Italy, to write the Etruscan language and then Latin, the Roman language. It was through Latin that the Roman alphabet came to much of Europe, and later the rest of the world.*

## LANGUAGE FAMILIES AND LANGUAGE CHANGE

In 1786, Sir William Jones, a scholar working in India, recognized that many European languages (Latin, Greek, the Celtic languages, the Germanic languages – including English) as well as Old Iranian and Sanskrit (the ancestor of many modern languages of India and Pakistan) have so many similarities in vocabulary and grammar that they must all be related. Together they form what has come to be known as the Indo-European language family.

Since then many language families have been recognized, and it is generally accepted that each family is descended from an ancestral proto-language. Where and when each proto-language was originally spoken is a matter for discussion among historical linguists and prehistoric archaeologists. The origin of the Indo-Europeans has for long been a thorny question in European prehistory and in the 1930s and 1940s took on unpleasant political overtones with the racist claims for “Aryan” (i.e. Indo-European) racial supremacy made then by Adolf Hitler and the National Socialists.

Inevitably, the discussion is rather speculative, since direct evidence is not available until the time that the languages in question were recorded in written form, but archaeologists are beginning to address these problems in a more systematic way.

A specific language can come to be spoken in a given territory by one of four processes: by initial colonization; by divergence, where the dialects of speech communities remote from each other become more and more different, finally forming new languages, as in the case of the various descendants of Latin (including French, Spanish, Portuguese, Italian, etc.); by convergence, where contemporaneous languages influence one another through the borrowing of words, phrases, and grammatical forms; and by language

replacement, where one language in the territory comes to replace another.

Language replacement can occur in several ways:

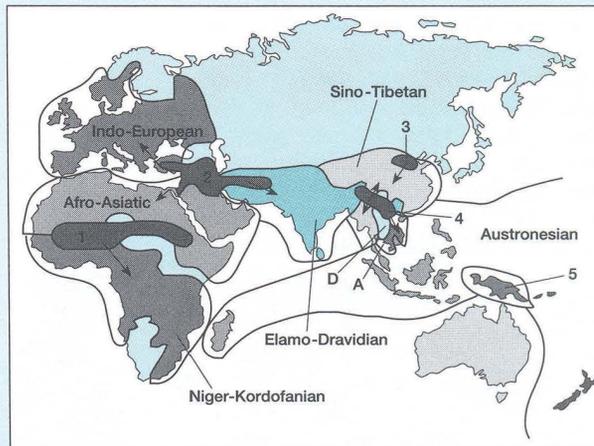
- 1 by the formation of a trading language or *lingua franca*, which gradually becomes dominant in a wide region;
- 2 by elite dominance, whereby a small number of incomers secure power and impose their language on the majority;
- 3 by a technological innovation so significant that the incoming group can grow in numbers more effectively. The best example is farming dispersal.
- 4 by contact induced language change, where adjacent communities speaking different languages come into more sustained contact

It is now widely accepted that the Bantu languages of Africa took up their vast area of distribution as a result of farming dispersal with other technical innovations (including iron-working), from west Africa.

Another case of farming dispersal is provided by the Austronesian languages of Southeast Asia and the Pacific, including the Polynesian languages. The first Polynesians may have been associated with the spread of Lapita ware as noted on the opposite page, although molecular research now suggests that the picture may be more complicated.

The distribution of the Indo-European languages has generally been regarded as a case of elite dominance (with mounted nomads from north of the Black Sea at the beginning of the Bronze Age constituting the elite), but the alternative view has been advanced that proto-Indo-European came to Europe from Anatolia around 6000 BC with the first farmers.

As noted in Chapter 11 (see box, pp. 454–55), there are correlations between the distribution of language families and of molecular genetic markers which indicate that both have much to teach us about world population history, and this is one of the growth areas of archaeological research.



- 1 sorghum/millet
- 2 wheat/barley
- 3 millet
- 4 Asian rice
- 5 taro/sweet potato

D Daic  
A Austroasiatic

Major areas of primary domestication of selected food plants and distributions of selected language families whose extent may be ascribed to agricultural dispersal. The areas of primary crop domestication are numbered, and Southeast Asian language families are indicated by letters.

## MOLECULAR GENETICS AND POPULATION DYNAMICS: EUROPE

Molecular genetic research is now beginning to give significant new information about population histories, and in particular about the first peopling of the continents (see boxes, pp. 454–55, and p. 456). The story of the initial colonization of land masses is inevitably a migrationist one, as the Polynesian case (p. 466) illustrates, although more work needs to be done on the demography of local populations.

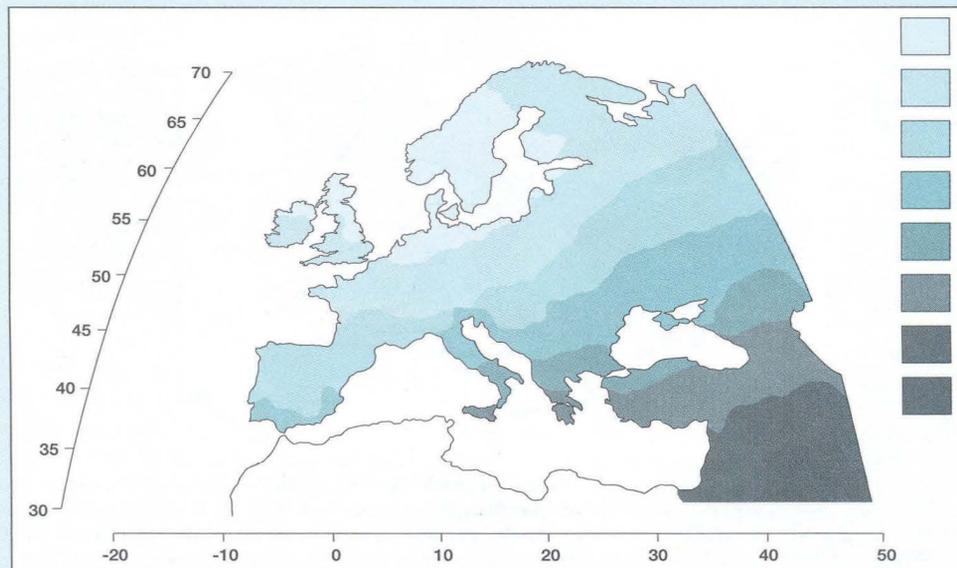
The case of early Europe illustrates how the patterns are changing. Initially the map of one genetic marker, the Rhesus negative gene, produced the pattern seen on the map on p. 454. Subsequent work by Luca Cavalli-Sforza and his associates with a principal component of data relating to 32 classical genetic markers produced a map of the first principal component of the variability, seen below. This shows pronounced clines from southeast to northwest. Such a map is a palimpsest, a compound overlay of

the effects of different processes at different times, with no way of disentangling these. However, these workers attributed the pattern to the spread of farming from Anatolia to Europe at the beginning of the Neolithic period around 6500 BC, which they viewed as a demographic “wave of advance,” a process of demic diffusion. This would have left the genetic markers of the earlier, Upper Paleolithic population predominating in the northwest, where the demic diffusion process was least pronounced.

The impact of DNA studies has modified this picture significantly. In the first place work on mitochondrial DNA (mtDNA) by Brian Sykes, Martin Richards, and their colleagues suggested that several haplogroups are present in the modern European populations. Moreover, by studying the distribution of each haplogroup in turn it is possible to suggest a date for the initial spread – usually the initial arrival in Europe – for each. This has led them

to suggest that about 20 percent of the modern European gene pool was indeed contributed by the population of first farmers arriving from Anatolia about 8500 years ago (haplogroup J). About 10 percent remains from the initial peopling of Europe by our species from 50,000 years ago, but the largest contribution of 70 percent is contributed by haplogroups whose expansion is dated between 14,000 and 11,000 years ago, again coming to Europe from Anatolia. They agree then with the strong contribution made by Anatolia to the European gene pool, but place the principal processes much earlier, back in the Upper Paleolithic. This view has been criticized by some writers, but is complemented by the work of Antonio Torroni and colleagues, again using mtDNA, and by that of Patrizia Malaspina, Rosaria Scozzari, and Andrea Novelletto and their colleagues working with Y-chromosomal types.

Torroni’s conclusion is that a major population expansion from the “Atlantic zone” of southwestern Europe occurred around 15,000 to 10,000 years ago, after the Late Glacial climatic maximum. This expansion is associated with an autochthonous European haplogroup (haplogroup V) which may



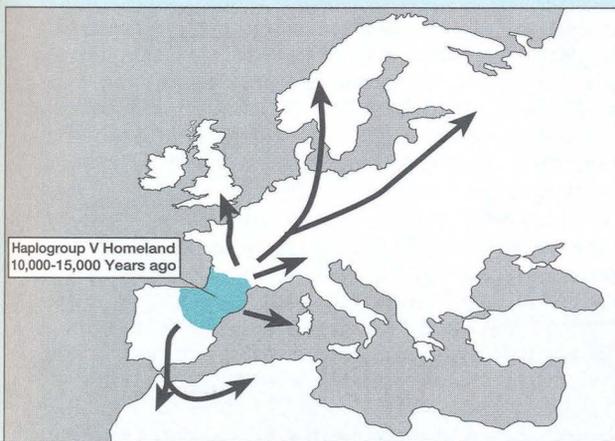
*A synthetic map of Europe and western Asia, using the first principal component of the 32 genetic markers: this was interpreted by Cavalli-Sforza et al. as the result of a population “wave of advance” from Anatolia to Europe with the spread of farming. The scale is an arbitrary one, from 1 to 100.*

*Map of Europe (right) depicting the most likely homeland, 10,000 to 15,000 years ago (shaded area), of haplogroup V and its pattern of diffusion in the aftermath of the glacial maximum.*

have originated in north Iberia or southwestern France around 15,000 years ago.

This view finds very strong support from the Y-chromosome studies of Malaspina and her colleagues. Indeed it is clear now that, as Lewis Binford has recently pointed out, climatic factors have to be taken very seriously into account. During the Late Glacial cold maximum in the Younger Dryas period, prior to 15,000 years ago, the population of Europe retreated to rather localized refugia, and in the succeeding millennia Europe was effectively recolonized from these refugia, rather than from Anatolia. Although there are still controversies of interpretation, the mtDNA data and the Y-chromosome data currently seem to support a picture of several colonization episodes from Anatolia, but with other very significant demographic episodes internal to Europe activated by the climatic changes during and after the last glacial period.

More work remains to be done, and already ancient DNA is beginning to play a part: Sykes, Richards, and their colleagues have analyzed mtDNA from early farming burials in central Europe and confirmed the presence in them of haplogroup J, which they had independently predicted would be associated with the early farming population. In ten years time we shall know more: this is a very active field of research.



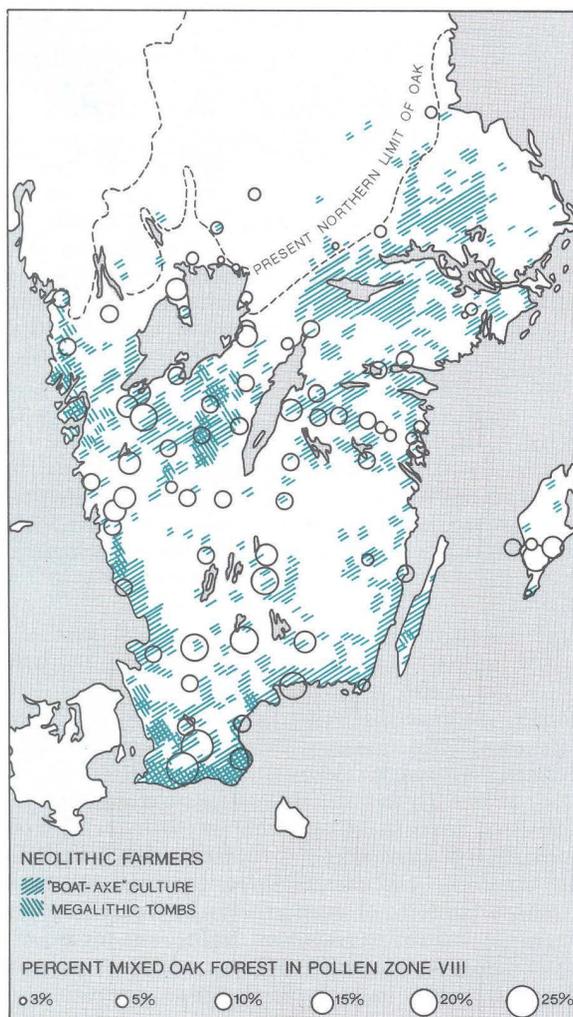
to move upstream. Simultaneously it may participate in a system involving a wild rabbit population whose density fluctuates in a 10-year cycle because of predators or disease. It may also participate in a system of exchange with an Indian group occupying a different kind of area from which it receives subsistence products at certain predetermined times of the year, and so on. All these systems compete for the time and energy of the individual Indian; the maintenance of his way of life depends on an equilibrium among systems. Culture change comes about through minor variations in one or more systems which grow, displace or reinforce others and reach equilibrium on a different plane.

The strategy of the process school is therefore to isolate each system and study it as a separate variable. The ultimate goal of course is a reconstruction of the entire pattern of articulation, along with all related systems, but such complex analysis has so far proved beyond the powers of the process theorists. (Flannery 1967, 120.)

This statement moves at once into the language of systems thinking, discussed in a later section. But it is not always necessary to use systems language in this context. Moreover, Flannery places great emphasis here on the environment – on what he terms “non-cultural phenomena.” Some critics of the New Archaeology in its early days felt that too much emphasis was placed on the economy, especially subsistence, and not enough on other aspects of human experience, including the social and the cognitive. But that does not diminish the force of what processual archaeology at once achieved and has retained: the focus on the analysis of the working of different aspects of societies, and the study of how these fit together to help explain the development through time of the society as a whole.

Another important point was made already in 1958, before the New Archaeology had formally begun at all. Gordon Willey and Philip Phillips wrote then: “In the context of archaeology, processual interpretation is the study of the nature of what is vaguely referred to as the culture-historical process. Practically speaking it implies an attempt to discover regularities in the relationships given by the methods of culture-historical integration.” (Willey and Phillips 1958, 5–6.) In other words, explanation involves some element of generalization, and the discovery of “regularities.”

As we shall see in the next section, much discussion today concerns the role of generalization in explanation, and how far the historical events we are analyzing were unique and, therefore, cannot be considered as general instances of any underlying process at all.



*Conjunction of Neolithic farming with deciduous forest in Scandinavia.*

## Applications

If all this seems rather abstract, it may be useful to give an example from the ecological side of archaeology of the way processual thinking has more to offer than the old school of thought. This is appropriate because the ecological-economic approach was in many ways a precursor of the New Archaeology (see Chapter 1).

In 1952, the British archaeologist Grahame Clark sought to explain the pattern of early farming settlements in Scandinavia, following his own studies of the Mesolithic (hunter-gatherer) period there. He plotted on a map the distribution of finds of the so-called “boat

axe” culture – an indicator of the activities of the early farmers – and also the occurrence of megalithic tombs, taken again as an indicator of settled farming communities. On the same map he also plotted, using pollen information then becoming available, the distribution of deciduous (mainly oak) forests in the relevant climatic subdivision, termed in Scandinavia the Subboreal period (c. 4000–1500 BC). After some discussion, and with careful reservations, he stated: “the coincidence of economic and ecological zones is sufficiently marked to justify the hypothesis that the northern margins of the deciduous forest in fact determined the limits of the early spread of farming in the countries of northern Europe.” (Clark 1952, 21)

Clark thus explained the distribution of early farming cultures in terms of the extent of deciduous forest, making the inference from his data that there was some kind of necessary connection, and that these farming cultures were not adapted to live in the zone of coniferous forests beyond. Now, as we shall see below, it is a matter for discussion just how far the simple demonstration of a correlation between one thing and another actually takes us toward a truly satisfying explanation.

Grahame Clark’s outlook in the 1950s, with its emphasis on the efficient adaptation of human society and culture to its environment, has much in common with the subsequent work of Lewis Binford. In 1968 Binford produced one of the first general explanations (where the New Archaeology set out to explain a class of events) of the farming revolution. In his paper, “Post-Pleistocene Adaptations,” he gave the sort of generalizing explanation that the New Archaeology set as its goal (see box). Yet, as we shall see below, this general approach could be criticized as taking too “functionalist” a view of human affairs, laying more stress on the environment, demography, and subsistence than on social or cognitive factors.

It is interesting to contrast Binford’s approach with that of Barbara Bender in 1978. Working from a broadly Marxist perspective, she argued that, before farming began, there was competition between local groups who tried to achieve dominance over their neighbors through feasting, and the expenditure of resources on conspicuous ritual and on exchange. It was these demands that led to the need to increase subsistence resources and so to a process of intensification in the use of land and the development of food production.

The early processual archaeology may reasonably be termed *functional-processual*. It is notable, and understandable, that many functional-processual explanations are applied to hunter-gatherer and early farming communities, where subsistence questions often seem

## THE ORIGINS OF FARMING: A PROCESSUAL EXPLANATION

In 1968, Lewis Binford published an influential paper, "Post-Pleistocene Adaptations," in which he set out to explain the origins of farming, or food production. Attempts to do this had been made by earlier scholars, notably Gordon Childe and Robert Braidwood (see box, pp. 280–81). But Binford's explanation had one important feature that distinguished it from earlier explanations and made it very much a product of the New Archaeology: its generality. For he was setting out to explain the origins of farming not just in the Near East or the Mediterranean – although he focused on these areas – but worldwide. He drew attention to global events at the end of the last Ice Age (i.e. at the end of the Pleistocene epoch, hence the title of his paper).

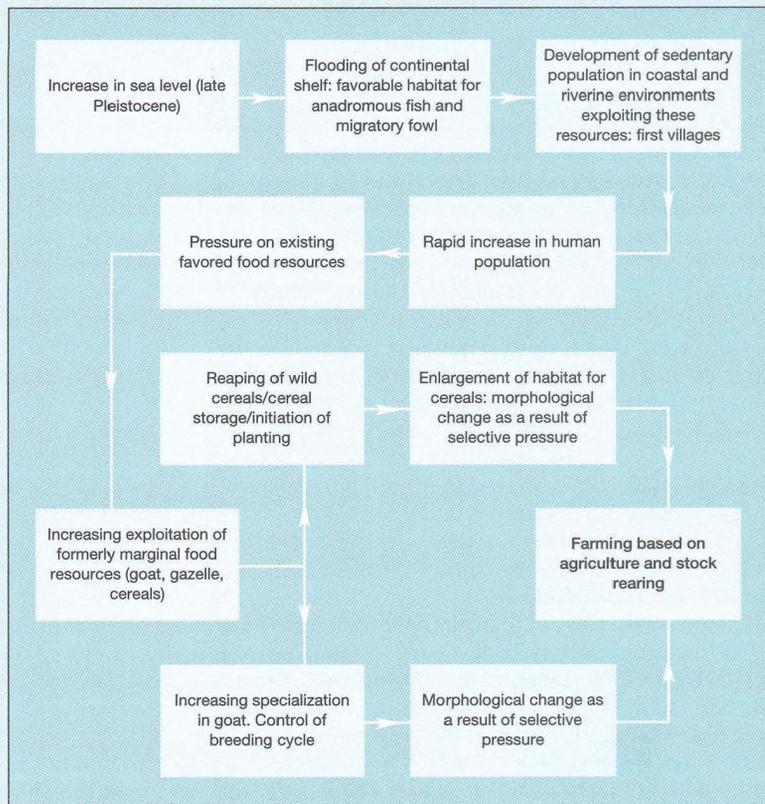
Binford centered his explanation on demography: he was concerned with population dynamics within small communities, stressing that once a formerly mobile group becomes sedentary – ceases to move around – its population size will increase markedly. For in a settled village the constraints no longer operate that, in a mobile group, severely limit the number of small children a mother can rear. There is no longer the difficulty, for instance, of carrying small children from place to place. Binford thus saw as the nub of the question the fact that in the Near East some communities (of the Natufian culture around 9000 BC) did indeed become sedentary before they were food-producing. He could see that, once settled, there would be considerable population pressure, in view of the greater number of surviving children. This would lead to increasing use of locally available plant foods such as wild cereals that had hitherto been considered marginal and of little value. From the intensive use of cereals, and the

introduction of ways of processing them, would develop the regular cycle of sowing and harvesting, and thus the course of plant-human involvement leading to domestication would be well under way.

But why did these pre-agricultural groups become sedentary in the first place? Binford's view was that rising sea levels at the end of the Pleistocene (caused by the melting of polar ice) had two significant effects. First, they reduced the extent of the coastal plains available to the hunter-gatherers. And second, the new habitats created by the rise in sea level offered to human groups much greater access to migratory fish

("anadromous" species, i.e. fish such as salmon that swim upriver from the sea to spawn) and to migrant fowl. Using these rich resources, rather as the inhabitants of the Northwest Coast of North America have done in more recent times, the hunter-gatherer groups found it possible for the first time to lead a sedentary existence. They were no longer obliged to move.

That encapsulates all too concisely the outline of Binford's explanation. In some respects it is seen today as rather too simple (see box, pp. 280–81). Nevertheless, it has many strengths. For although the focus was on the Near East, the same arguments can equally be applied to other parts of the world. Binford avoided migration or diffusion, and analyzed the position in processual terms.



## PART II Discovering the Variety of Human Experience

to have had a dominant role. For the study of more complex societies, however, a development of this approach, which we may term the *cognitive-processual*, has recently seemed more promising. For it does not rest solely on the somewhat holistic approach of functional-processual archaeology, but is willing to consider also the thoughts and actions of individuals (even if these can rarely be recognized directly in the archaeological record). In this respect it responds to some of the aims of postprocessual archaeology, but without the anti-scientific rhetoric and the reliance upon unbridled empathy which is sometimes advocated by exponents of the latter.

### Marxist Archaeology

Following the upsurge in theoretical discussion that followed the initial impact of the New Archaeology, there has been a reawakening of interest in applying to archaeology some of the implications of the earlier work of Karl Marx, many of which had been re-examined by French anthropologists in the 1960s and 1970s. But it should be remembered that, already in the 1930s, such avowed Marxist archaeologists as Gordon Childe were producing analyses that were broadly in harmony with the principles of Marxist archaeology (described in the box opposite). Childe's book *Man Makes Himself* (1936) is a splendid example, in which he introduced the concepts of the Neolithic (farming) and urban revolutions. Moreover, Soviet archaeologists produced Marxist explanations of change that owed more to traditional Marxism than to French neo-Marxism: a good example is the explanation by Igor Diakonoff for the emergence of state society in Mesopotamia, discussed below.

Even the explanations that have been developed by archaeologists influenced by French neo-Marxism ("structural Marxism"), such as by Antonio Gilman (1981), Michael Rowlands and Susan Frankenstein (1978), and Jonathan Friedman and Michael Rowlands (1978), can often be seen to fit well into the traditional Marxist mold. Examples that do not – where the neo-Marxist emphasis on the ideological and cognitive (on the so-called "superstructure") is particularly significant – are mentioned below.

Gilman's study sets out to explain the shift from egalitarian to ranked society in the Neolithic and Bronze Ages of Spain and Portugal. Some previous explanations had stressed that a society with a partly centralized administration (organized by a chieftain) could in certain ways work more efficiently than an egalitarian society without such a central figure. Gilman, on the other hand, questioned whether the institution of chief-

tainship was particularly beneficial to society as a whole. He argued rather that chiefs attained power through conflict and maintained themselves in power by force of arms, living a life of relative comfort through the exploitation of the common people. The notion of the clash of interests, the struggle between classes or sectors of society and the exploitation of the poor by the elite, is a typically Marxist one.

Frankenstein and Rowlands developed a model to explain the emergence of ranking in the central European Iron Age, emphasizing the significance of the importing of prestige goods from the Mediterranean by local chieftains. Once again, chieftains do very well out of their privileged position. They effectively corner the market in imported goods, keeping the best for themselves and handing on other imports to their most trusted henchmen. According to the Marxist model, the chief is seen as perpetrating a "rip-off" rather than acting altruistically as a wise official for the greater good of the community as a whole.

Friedman and Rowlands developed what they call an "epigenetic" model for the evolution of "civilization" of much wider application. In the case of each civilization they locate the prime locus of change among social relations within the society in question, and in the tensions between differing social groups.

There is nothing here that is inappropriate to a processual analysis, and for that reason the two approaches cannot be clearly distinguished. The positive features that these Marxist analyses share with functional-processual archaeology include a willingness to consider long-term change in societies as a whole, and to discuss social relations within them. On the other hand, many such Marxist analyses seem, by comparison with the processual studies of the New Archaeologists, rather short on the handling of concrete archaeological data. The gap between theoretical archaeology and field archaeology is not always effectively bridged, and the critics of Marxist archaeology sometimes observe that since Karl Marx laid down the basic principles a century ago, all that remains for the Marxist archaeologists to do is to elaborate them: research in the field is superfluous. Despite these differences, functional-processual archaeology and Marxist archaeology have much in common. This is all the more clear when they are both contrasted with structuralist and postprocessual approaches.

### Evolutionary Archaeology

For some years neo-evolutionary thought and the direct influence of Charles Darwin have been experiencing something of a renaissance in archaeology, with

## MARXIST ARCHAEOLOGY: KEY FEATURES

Marxist archaeology, especially in its more traditional form, is based mainly on the writings of Karl Marx and Friedrich Engels, who were influenced by Charles Darwin and Lewis Henry Morgan (see Chapter 1). Several features may be stressed:

1 It is evolutionary: it seeks to understand the processes of change in human history through broad general principles.

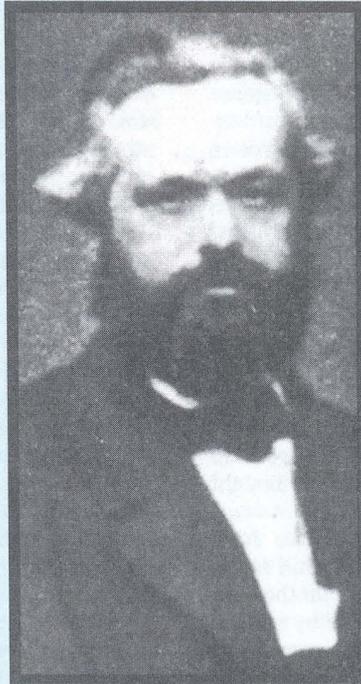
2 It is materialist: it sets the starting point of the discussion in the concrete realities of human existence, with emphasis on the production of the necessities of life.

3 It is holistic: it has a clear view of the workings of society as a whole, and of the interrelation of the parts within that whole (see 8 below).

4 Marx constructed a typology of different forms of human societies or "social formations" to which correspond different "modes of production." These include, before the capitalist mode, primitive communism, the ancient (i.e. Greek and Roman), Asiatic, and feudal modes of production.

5 Change within a society comes about mainly from the *contradictions* that arise between the forces of production (including the technology) and relations of production (mainly the social organization). Characteristically these contradictions emerge as a struggle between classes (if this is a society where distinct social classes have already developed). Emphasis on class struggle and internal differences is a feature of most Marxist explanations. This may be described as an *agonistic* view of the world where change comes about through the resolution of internal dissent. It may be contrasted with the *functionalist* view favored by the early New Archaeology where selective pressures towards greater efficiency are seen to operate, and changes are often viewed as mutually beneficial.

6 In traditional Marxism the



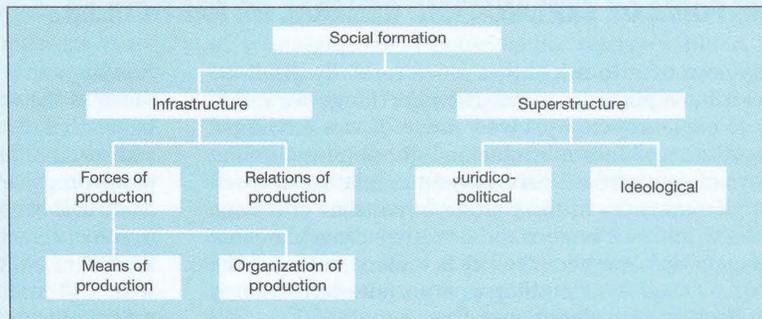
ideological superstructure, the whole system of knowledge and belief of the society, is seen as largely determined by the nature of the productive infrastructure, the economic base. This point is disputed by the neo-Marxists (see main text) who regard infrastructure and superstructure as interrelated and mutually influential, rather than one as dominant and the other subordinate. They can point to

passages in the writings of Marx which support this view.

7 Marx was a pioneer in the field of the sociology of knowledge where, as implied above, the belief system is influenced by, and indeed is the product of, the material conditions of existence, the economic base. This implies that as the economic base evolves, so too will the belief system of society, in a systematic way.

8 Marx's view of the internal structure of society may be set out as shown in the chart below. The analysis is applicable to the various different social formations into which human societies may be divided.

9 The systems approach within the mainstream of processual archaeology has a great deal in common with the above analysis. But to embrace the term "Marxist" often carries with it political overtones. Many Marxist archaeologists naturally apply the Marxian analysis of society to present-day societies also, which they see as being involved in a continuing class struggle in which their own alignment is with a proletariat in conflict with a putative capitalist elite. Most processual archaeologists would prefer to separate their own political views as far as possible from their professional work. Many Marxist archaeologists would argue that such a separation is impracticable, and would suspect the motives of those who make such a claim.



The internal structure of society according to Marx.

the notion that the processes responsible for biological evolution also drive culture change. Three strands of thinking may currently be recognized.

In Britain Richard Dawkins, an evolutionary advocate in the tradition of Thomas Huxley, already in 1976 proposed that cultural evolution is produced by the replication of “memes,” the analogue of the genes which are now recognized as the instruments of biological evolution and which take molecular form in DNA. A replicator is an entity that passes on its structure directly in the course of replication, and Dawkins suggested that “examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots, of building arches.” Ben Cullen’s preferred replicator was the Cultural Virus, and he saw the process of diffusion through cultural contact as the result of the transmission of Cultural Viruses. Critics have however argued that in the absence of any specific mechanism for the cultural replication process (to compare with DNA as the embodiment of the genes) these are little more than metaphors, offering little further insight into the processes in question.

The evolutionary anthropologists such as John Tooby and Leda Cosmides see the modern mind as the product of biological evolution, and argue that the only way so complex an entity can have arisen is by natural selection. In particular they argue that the human mind evolved under the selective pressures faced by hunter-gatherers during the Pleistocene period, and that our minds remain adapted to that way of life. Several writers have followed this lead, seeking to place the evolution of mind in an explicitly evolutionary framework. Dan Sperber has written of the “modularity of mind,” seeing the pre-sapiens mind as functioning with a series of modules for different activities (hunting, planning, social intelligence, natural history intelligence, speech etc.), and Steven Mithen has argued that

the “human revolution” which marked the emergence of our species was the result of a new cognitive fluidity which emerged as these specialized cognitive domains came to work together. These are fascinating insights, but they have not yet been supported by any neurological analysis of the hardware of the brain and of its evolution. A critic could suggest that, as in the case of the “meme,” the argument is simply a narrative with a metaphorical quality, lacking any precise insights into physiological mechanisms.

The advocates of evolutionary archaeology in the United States do not propose the use of the “meme” or the Cultural Virus as an explanatory mechanism, nor do they embrace evolutionary psychology or evolutionary anthropology. They do however advocate the application of Darwinian evolutionary theory to the archaeological record, and they emphasize the value of the concept of the lineage, defined as “a temporal line of change owing its existence to heritability.” They can justifiably point to long-standing cultural traditions in different parts of the world which reflect the inheritance of cultural traits from generation to generation. And they are right to remind us that Darwinian evolution was proposed and widely accepted as explaining the evolution of species long before the work of Mendel clarified the genetic mechanisms of transmission, or the research of Crick and Watson established their molecular basis in the structure of DNA. It could be argued that they have shown how the transmission of human culture can validly be seen in Darwinian evolutionary terms. What is less clear, however, is that to analyze it in those terms offers fresh insights not already available to the archaeologist. Evolutionary archaeology has not yet produced case studies of culture change which explain its processes more coherently or persuasively than hitherto: that is the challenge which it currently faces.

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## **THE FORM OF EXPLANATION: GENERAL OR PARTICULAR**

It is now time to ask rather more carefully what we mean by explanation. The different things we might try to explain were reviewed above. It was envisaged that different kinds of problem might require different kinds of explanation. An explanation relating to specific circumstances in the past, or to patterns of events, seeks to make us understand how they came to be that way, and not another. The key is understanding: if the “explanation” adds nothing to our understanding it is not (for us) an explanation.

As a first approximation we can distinguish two diametrically opposite approaches to the problem. The

first approach is specific: it seeks to know more and more of the surrounding details. It operates with the belief that if one can establish enough of the antecedent circumstances, of the events leading up to the happening we hope to explain, then that happening itself will become much clearer for us. Such explanation has sometimes been called “historical,” although it must be said that not all historians would be happy with that description.

Some historical explanations lay great stress on any insights we can gain into the ideas of the historical people in question, and for that reason are sometimes

termed *idealist*. R.G. Collingwood used to say that if you wanted to know why Caesar crossed the Rubicon it was necessary to get inside the mind of Caesar, and thus to know as many of the surrounding details, and as much about his life, as possible.

The New Archaeology laid much more stress on generalization. Willey and Phillips, as we have seen, spoke in 1958 of “regularities,” and the early New Archaeologists followed this lead, and turned to the philosophy of science of the time. Unluckily, perhaps, they turned to the American philosopher Carl Hempel, who argued that all explanations should be framed in terms of those most ambitious generalizations: *natural laws*. A lawlike statement is a universal statement, meaning that in certain circumstances (and other things being equal) X always implies Y, or that Y varies with X according to a certain definite relationship. For Hempel, the events or pattern we might be seeking to explain (the “explanandum”) could be accounted for by bringing together two things: the detailed antecedent circumstances, and the law which, when applied, would by deductive reasoning allow the forecasting of what actually happened. The lawlike statement and the antecedent statement together form the “explanans.” The form of explanation is seen as a *deductive* one, because the outcome is deduced from antecedent circumstances, plus the law. It is also *nomothetic* because it relies on lawlike statements (from Greek *nomos*, “law”). This system of Hempel’s is sometimes called the deductive-nomothetic or D-N form of explanation.

Just a few of the second and third generation New Archaeologists then set off to try to write archaeology in the form of universal laws: a notable example is the book by Patty Jo Watson, Steven LeBlanc, and Charles Redman, *Explanation in Archaeology* (1971). Most archaeologists, however, saw that it is very difficult to make universal laws about human behavior that are not either very trivial, or untrue. Traditionalists, such as the Canadian archaeologist Bruce Trigger, then argued for a return to the traditional explanations of history, for a form of explanation one might term *historiographic*. Certainly the initial foray into the philosophy of science by the New Archaeologists did not prove successful. The wilier archaeologists, such as Kent Flannery, saw that the “law and order” school was making a mistake, and producing only “Mickey Mouse laws” of little conceivable value. Flannery’s favorite example was: “as the population of a site increases, the number of storage pits will go up.” To which he replied, scathingly: “leapin’ lizards, Mr. Science!” Some critics of the New Archaeology have seized on this setback to suggest that this school is (or was) in general “scientistic” (i.e. modeling itself unthinkingly

on the hard sciences). And certainly this heavy reliance upon lawlike explanation can be termed positivistic. But one of the positive contributions of the New Archaeology was in fact to follow the scientific convention of making specific and explicit, as far as is possible, the assumptions on which an argument rests.

Scholars writing since the mid-1970s, within the mainstream tradition of processual archaeology, still seek to learn from the philosophy of science, although it is no longer to Carl Hempel that they turn. The work of Karl Popper is much less rigid in its approach, with its insistence that every statement, so far as possible, should be open to testing, to setting up against the data: in this way, untrue statements, and generalizations that do not hold up, can be refuted. Moreover, these writers say, there is nothing wrong with deductive reasoning. It makes very good sense to formulate a hypothesis, establish by deduction what would follow from it if it were true, and then to see if these consequences are in fact found in the archaeological record by testing the hypothesis against fresh data: that is the *hypothetico-deductive* or H-D approach, and it does not carry with it the same reliance on lawlike statements as the D-N approach. It is this willingness to subject one’s beliefs and assumptions to the confrontation with harsh reality that distinguishes scientific work from mere uncontrolled exercise of the imagination – or so philosophers of science, and with them processual archaeologists, would argue.

## The Individual

More recently, some processual archaeologists, following the approach of Popper (and of free-market economists such as Friedrich von Hayek) have shown themselves more willing to consider the thoughts and actions of individuals, and to seek to recover aspects of the thinking of early societies. Their approach, which has been described as methodological individualism, would claim to be “scientific” (using Popper’s concept of refutability as a criterion for science), but it no longer dismisses the attempt to investigate past symbolic systems as “paleopsychology,” as some of the earlier New Archaeologists would have done.

The Cambridge archaeologist Ian Hodder has argued that archaeologists should abandon the generalizing approach and the scientific method advocated by the New Archaeology, and seek to return to the idealist-historical outlook of R.G. Collingwood, laying much greater emphasis on the specific past social context (see below). But there is perhaps a middle way between the two extremes, where Lewis Binford (with Carl Hempel in the background) on the one hand stands opposed to

## PART II Discovering the Variety of Human Experience

Ian Hodder (with R.G. Collingwood in the background) on the other. Between the two lies the possibility of considering the role of the individual, as indicated by Karl Popper and James Bell, without the positivist extreme of the one approach or the total rejection of scientific method of the other.

This renewed emphasis on the individual as an agent of change within society leads back to a number of lines of argument presented earlier. First it takes us back to the notion of the *cognitive map*, introduced in Chapter 10 and again to the philosophical position of

methodological individualism. It relates also to the notion of *individual experience*, considered in the discussion of place and memory, also in Chapter 10, and hence to the phenomenological approach. The individual in society and the notion of *identity* is considered in Chapter 5, and the position of the *individual artist* is treated in Chapter 10. The individual as *agent* or as *actor*, as noted again below (p. 492), has been considered afresh in discussions of the origins of state societies. This is an area where approaches from different perspectives are producing important new insights.

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### ATTEMPTS AT EXPLANATION: ONE CAUSE OR SEVERAL?

As soon as one starts to address the really big questions in archaeology, matters become complicated. For many of the big questions refer as we have seen not to a single event, but to a class of events. The enigma of the worldwide development of farming at the end of the last Ice Age has already been mentioned as one of these big questions in the main text above. Lewis Binford's attempted explanation was described in the box on the origins of farming. Kent Flannery's approach is discussed below.

Another of the big questions is the development of urbanization and the emergence of state societies. This process apparently happened in different parts of the world independently. Each case was, in a sense, no doubt unique. But each was also, it can be argued, a specific instance (with its own unique aspects) of a more general phenomenon or process. In just the same way, a biologist can discuss (as Darwin did) the process by which the different species emerged without denying the uniqueness of each species, or the uniqueness of each individual within a species.

If we focus now on the origins of urbanization and the state, we shall see that this is a field where many different explanations have been offered.

#### The Origins of the State

If we look at different explanations in turn, we shall find that some of them are in their way very plausible. Often, however, one explanation works more effectively than another when applied to a particular area – to the emergence of the state in Mesopotamia, for instance, or in Egypt, but not necessarily in Mexico or in the Indus Valley.

**The Hydraulic Hypothesis.** The historian Karl Wittfogel, writing in the 1950s, explained the origin of the great civilizations in terms of the large-scale irrigation of the

alluvial plains of the great rivers. It was, he suggested, this alone that brought about the fertility and the high yields, which led to the considerable density of population in the early civilizations, and hence to the possibility of urbanism. At the same time, however, irrigation required effective management – a group of people in authority who would control and organize the labor needed to dig and maintain irrigation ditches, etc. So irrigation and “hydraulic organization” had to go together, and from these, Wittfogel concluded, emerged a system of differentiated leadership, greater productivity and wealth, and so on.

Wittfogel categorized the system of government characteristic of those civilizations founded on irrigation agriculture as one of “oriental despotism.” Among the civilizations to which this line of thinking has been applied are:

- Mesopotamia: the Sumerian civilization from c. 3000 BC and its successors
- Ancient Egypt: the Valley of the Nile from c. 3000 BC
- India/Pakistan: the Indus Valley civilization from c. 2500 BC
- China: the Shang civilization, c. 1500 BC, and its successors

Comparable claims have been made for the agriculture (although the irrigation was not based on a major river) both of the Valley of Mexico, and the Maya civilization.

**Internal Conflict.** In the late 1960s the Russian historian Igor Diakonoff developed a different explanation for state origins. In his model, the state is seen as an organization that imposes order on class conflict, which itself arises from increased wealth. Internal differentiation within the society is here seen as a major causative element, from which other consequences follow.

**Warfare.** Warfare between adjacent polities is increasingly seen as an agent of change (see p. 395). While in some cases there were cyclical conflicts between peer polities with little long-term effect, in others the result was conquest and the formation of larger, inclusive state societies. Kent Flannery has recently emphasized the historically documented role of individual military leaders in the initial formation of state societies (noting this as an example of the “agency” of the individual which postprocessual writers have sought).

**Population Growth.** An explanation much favored by many archaeologists focuses on the question of population growth. The 18th-century English scholar, Thomas Malthus, in his *An Essay on the Principle of Population* (1798), argued that human population tends to grow to the limit permitted by the food supply. When the limit or “carrying capacity” is reached, further population increase leads to food shortage, and this in turn leads to increased death rate and lower fertility (and in some cases to armed conflict). That sets a firm ceiling on population.

population growth → food shortage → increased death rate & lower fertility

Esther Boserup, in her influential book *The Conditions of Agricultural Growth* (1965), effectively reversed the position of Malthus. He had viewed food supply as essentially limited. She argued that agriculture will intensify – farmers will produce more food from the same area of land – if population increases. In other words, by shortening the periods during which land is left to lie fallow, or by introducing the plow, or irrigation, farmers can increase their productivity. Population growth can then be sustained to new levels.

population growth → introduction of new farming methods → increase in agricultural production

So increase of population leads to intensification of agriculture, and to the need for greater administrative efficiencies and economies of scale, including the development of craft specialization. People work harder because they have to, and the society is more productive. There are larger units of population, and consequent changes in the settlement pattern. As numbers increase, any decision-making machinery will need to develop a hierarchy. Centralization ensues, and a centralized state is the logical outcome.

These ideas can be made to harmonize very well with the work of the American archaeologist Gregory Johnson, who has used them in the study of smaller-scale societies. From recent ethnographic accounts of

!Kung San encampments in southwest Africa he showed that the level of organization rose with the increasing size of the encampment. Whereas in small camps the basic social unit was the individual or the nuclear family of 3–4 individuals, in large camps it was the extended family of around 11 people. In larger-scale societies, such as those of New Guinea, hierarchical social systems were needed in order to control disputes and maintain the efficient functioning of the society as a whole.

**Environmental Circumscription.** A different approach, although one that uses some of the variables already indicated, is offered by Robert Carneiro (see box overleaf). Taking as his example the formation of state society in Peru, he developed an explanation that laid stress on the constraints (“circumscription”) imposed by the environment, and on the role of warfare. Population increase is again an important component of his model, but the model is put together in a different way, and the development of strong leadership in time of war is one of the key factors.

**External Trade.** The importance of trading links with communities outside the homeland area has been stressed by several archaeologists seeking explanations for the formation of the state. One of the most elaborate of these is the model put forward by the American archaeologist William Rathje for the emergence of state societies in the Maya lowlands. He argued that in lowland areas lacking basic raw materials there will be pressure for the development of more integrated and highly organized communities able to ensure the regular supply of those materials. He used this hypothesis to explain the rise of the Classic Maya civilization in the lowland rainforest.

## Multivariate Explanations

All the preceding explanations for the origins of the state lay stress primarily on a chief variable, a principal strand in the explanation, even though there are several strands involved. Explanations, such as Karl Wittfogel’s, which emphasize a single factor, are termed *monocausal*. In reality, however, when there are so many factors at work, there is something rather too simplified about monocausal explanations. It is necessary somehow to be able to deal with several factors at once. Such explanations are termed *multivariate*. Of course, none of the explanations summarized above is so naive as to be truly *monocausal*: each involves a number of factors. But these factors are not systematically integrated. Several scholars have thus sought for

# ORIGINS OF THE STATE 1: PERU



was now between larger political units – the chiefdoms. As chiefdom conquered chiefdom, the size of political units greatly increased and centralization developed. The result of this process was the formation of the state. Valley-wide kingdoms emerged, then multi-valley kingdoms, until finally all of Peru was unified in a single powerful empire by the Incas.

In a 1970 paper, Robert Carneiro offered an explanation for the origins of the state in coastal Peru, laying stress on the factor of what he termed environmental circumscription (restrictions imposed by the environment). Population growth is also an important component of the explanation (and here his ideas relate to those of Esther Boserup discussed in the main text).

Early villages in coastal Peru were located in about 78 narrow valleys, flanked by desert. These villages grew, but as long as land was available for the settlement of splinter communities, they split from time to time so that they did not become too large. Eventually, a point was reached when all the land in a particular valley was being farmed. When this happened, the land already under cultivation was more intensively worked (with terracing and irrigation),

and less suitable land, not previously worked, was brought into cultivation.

Carneiro argued that population growth outstripped the increase in production gained through intensification, and warfare became a major factor. In the past, armed conflict had occurred simply out of a desire for revenge – now it was in response to a need to acquire land.

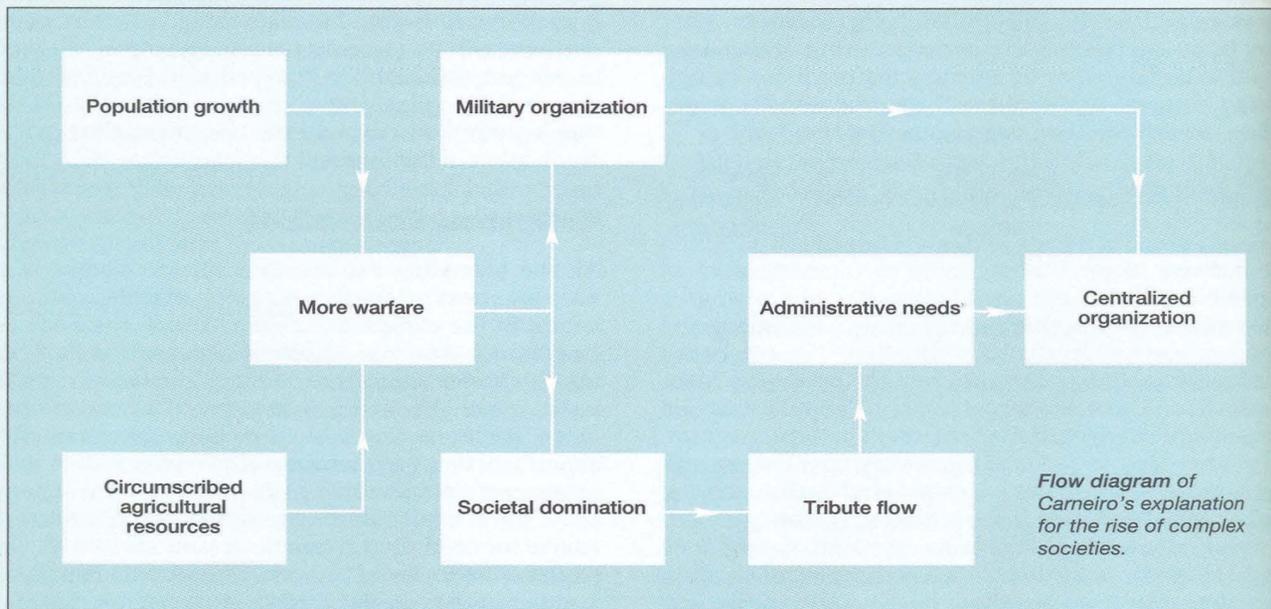
A village defeated in war became subordinate to the victorious village, and its land was appropriated. Moreover, the defeated population had no means of escape from its valley environment, enclosed by mountains and sea. If it remained on its own land it was as a subordinate tribute payer. In this way, chiefdoms were formed, and the stratification of society into classes began.

As land shortages continued, Carneiro argued, so did warfare, which

Carneiro has subsequently argued that the reduction in the number of political units and increase in their size is a process still continuing, one which will ultimately lead to a world state sometime in the future.

Like other so-called “monocausal” (single cause) explanations, this one does, in fact, draw on a series of factors working together. But it is highly selective in its choice of factors. And like all monocausal explanations, it has a “prime mover”: a basic process that sets the whole sequence of events going and continues to act as the driving force as they unfold. In this case, the prime mover is population growth.

As is always the case with a prime mover explanation, we are not told what sets it in motion.

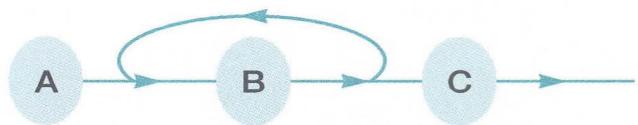


## 12 Why Did Things Change? Explanation in Archaeology

ways of coping with a large number of variables that simultaneously vary. Obviously, this is complicated and it is here that the systems terminology – already introduced in quite simple form in Kent Flannery’s 1967 definition of processual archaeology cited in an earlier section – can prove very useful.

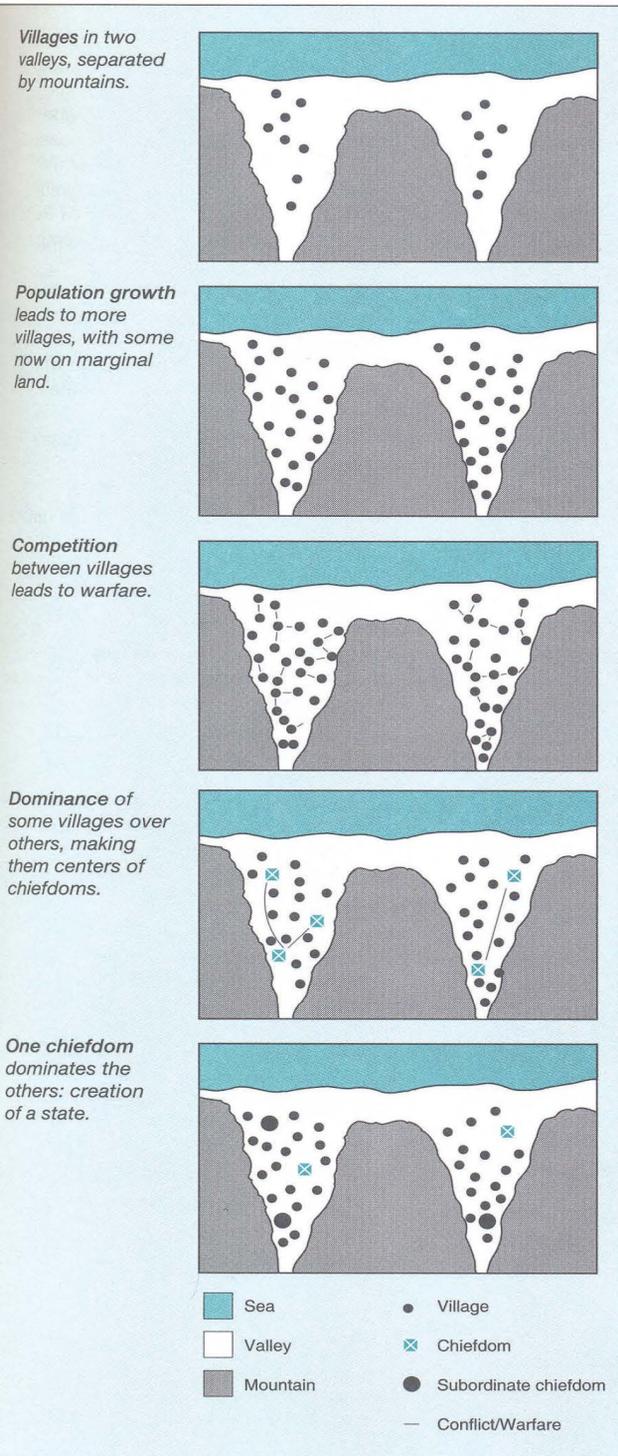
**The Systems Approach.** If the society or culture in question is regarded as a *system*, then it makes sense to consider the different things that are varying within that system, and to try and list these, and be explicit about them. Clearly, the size of population will be one of those *system parameters*. Measures of the settlement pattern, of production of different crops, materials, and so on, and measures of various aspects of social organization will all be parameters of the system. We can imagine the system proceeding over time through a series of successive *system states*, each defined by the values of the system variables at the time in question. The successive system states in sequence establish the *trajectory* of the system.

It is convenient to think of the overall system as broken down into several *subsystems*, reflecting the different activities of the system as a whole (see box overleaf). Each subsystem may be thought of as defined by the kind of activity that it represents: within it will be the humans involved in such activities, the artifacts and material culture involved, and those aspects of the environment that are relevant. Each subsystem will display, in common with all systems, the useful phenomenon of *feedback*. This concept was derived from the field of cybernetics (control theory).



The key notion is that of a system with *input* and *output*. If a portion of that input is channeled back to form a continuing part of the input, then that is known as “feedback.” This is important because it means that what is happening to the system at one moment can have an effect on the system state at the next moment.

If the feedback is negative, then a change in the external input produces *negative feedback*, which goes back, as input, to counter the original change. That is very significant because the countering of change makes for stability. All living systems employ negative feedback in this way. For instance, the temperature of the human body acts so that when body temperature rises we sweat: the output is such as to reduce the input



## ORIGINS OF THE STATE 2: THE AEGEAN A MULTIVARIATE APPROACH

The palace civilization of Minoan Crete developed around 2100 BC, while that of Mycenaean Greece reached its climax in the centuries following 1600 BC. In *The Emergence of Civilization* (1972), Colin Renfrew outlined an explanation in systems terms for the development of these state societies. The subsystems considered were those listed in the table, which have a general application, together with the metallurgical subsystem. This subsystem was given special treatment in the book because of the considerable importance of early metallurgy in the Aegean.

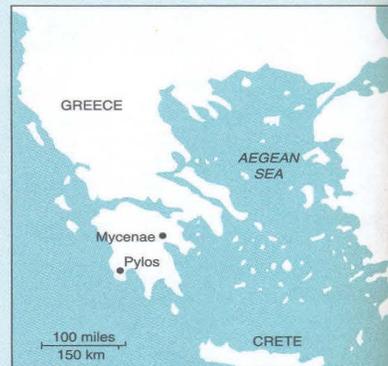
Each subsystem can be considered in its own right. For instance, in the subsistence subsystem, wheat and barley were the principal crops in the Neolithic period (6500–3000 BC), and sheep and goats with some cattle and pigs, the principal animals. But, Renfrew argued, the new crops (olive and vine) took on a special significance during the Early Bronze Age and played a major part during the heyday of the palaces in the Late Bronze Age. They allowed diversification, and offered individual

farmers the possibility of specializing. The exchange of products became necessary, and in this exchange the palaces could play a central redistributive role.

The mutual interactions of the subsystems were indicated by Renfrew in a simple diagram. He did not stress the dominance of any one subsystem: each interacted with all the others.

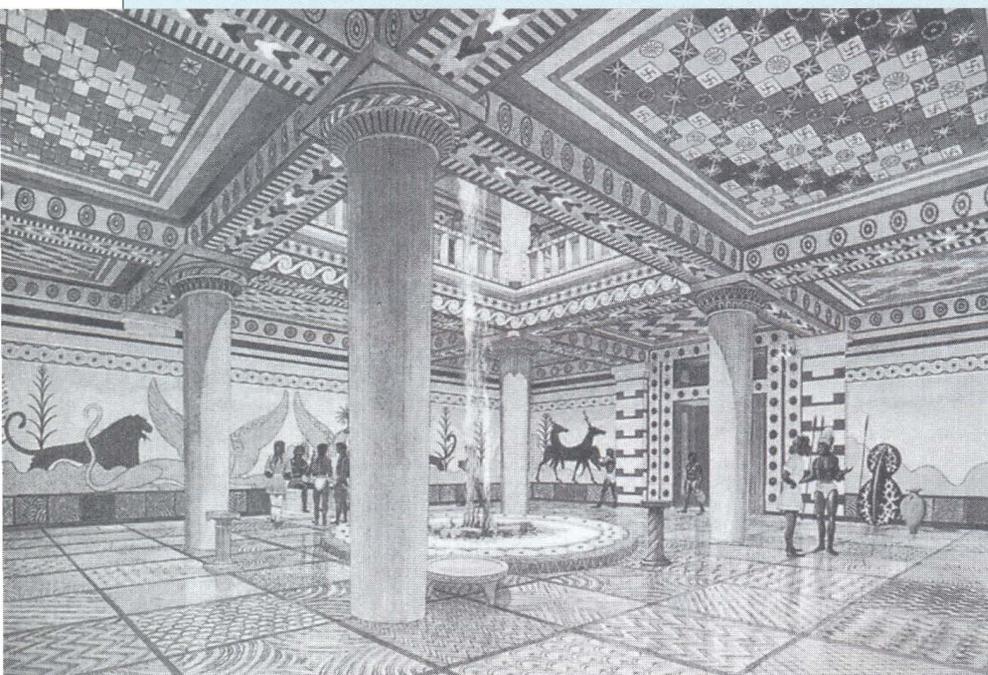
In the explanation of the rise of state societies in the Aegean, Renfrew emphasized the importance of what is known in systems theory as the multiplier effect: changes or innovations occurring in one field of human activity (in one subsystem of a culture) sometimes act so as to favor changes in other fields (in other subsystems). The multiplier effect is said to operate when these induced changes in one or more subsystems themselves act so as to enhance the original changes in the first subsystem.

For example, we might consider changes in some of the subsystems that favored growth in the metallurgical subsystem. In the craft technology subsystem, it was technical



developments, notably the pyrotechnological discoveries of the potter, that made metallurgy possible (see p. 335). Several changes in the social subsystem affected metallurgy. First, there was an increasing need for metal weapons arising from an increase in military hostilities (documented by the construction of fortifications in the Early Bronze Age). Second, a market grew up for objects of display with the production of new objects in gold and silver. And third, the growing custom of burying valuable metal objects with the dead helped to remove such objects from circulation and thus increase demand for them. The external trade subsystem also favored the development of metallurgy, because additional raw materials now became available.

Renfrew's explanation recognized that the essential drive towards growth and change came from the interaction of these various subsystems, through the working of the multiplier effect, and not primarily from any one prime mover. While it was possible to stress the importance of certain processes (e.g. increasing skill in metallurgy, and the development of the vine and olive), the explanatory emphasis was placed on the aggregate of the interactions.



*The palace civilization of Mycenaean Greece, as exemplified at Pylos in this reconstruction drawing by Piet de Jong.*

TABLE OF SUBSYSTEMS

*Subsistence subsystem, whose interactions and activities relate to the production and distribution of food resources*

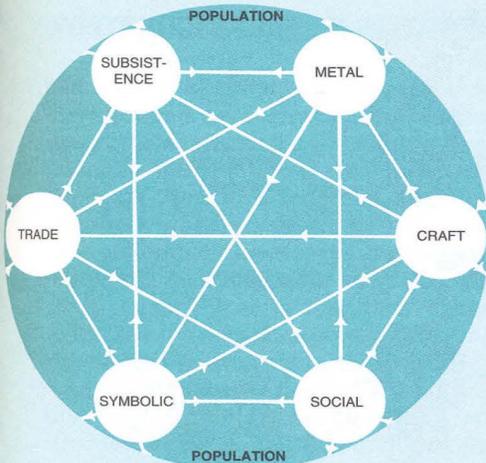
*Technological subsystem, defined by human activities that result in the production of material artifacts*

*Social subsystem, where the defining activities are those that take place between the members of the society (other than those in the two preceding subsystems)*

*Symbolic or projective subsystem, embracing all those activities, notably religion, art, and science, by which humans express their knowledge, feelings, and beliefs about their relationships with the world*

*External trade and communications subsystem, defined by all those activities by which information or material goods are transferred across the boundaries of the system*

*Population, although not defined strictly by human activities, may be thought of as a further subsystem*



*Interactions between the subsystems of the culture system. Sustained positive feedback between them – the multiplier effect – resulted in cultural change and growth.*

effect (i.e. the rise in external temperature). When a system is maintained in a constant state through the operation of negative feedback, this is known as *homeostasis* (from the Greek words, *homeo*, “the same”, and *stasis*, “standing” or “remaining”). Similarly, all human societies have devices that ensure they carry on much as before: if they did not they would radically change their natures almost every moment of their existence.

However, *positive feedback* can occur. When it does, the change produced (in the output) has a positive effect on the input, thus favoring more of the same. Growth occurs, and with it sometimes change. Positive feedback is one of the key processes underlying progressive growth and change, and ultimately the emergence of totally new forms: this is termed morphogenesis.

It is thus possible to consider the influence of one subsystem on another, looking in turn at the interactions of each pair (see box opposite).

In a 1968 paper, Kent Flannery applied the systems approach to the origins of food production in Mesopotamia during the period 8000–2000 bc. His cybernetic model involved an analysis of the various procurement systems used for the different plant and animal species that were exploited and of what he called “scheduling,” namely the choice between the relative merits of two or more courses of action at a particular time. Flannery regarded the constraints imposed by the seasonal variations in the availability of the different species and the need for scheduling as *negative feedback* in his systems model; that is to say, these two factors acted to hinder change and maintain the stability of the existing patterns of food procurement. Over the course of time, however, genetic changes in two minor species, beans and maize, made them both more productive and more easily harvested. The effects of these changes led to a greater and greater reliance on these two species, in a deviation amplifying or *positive feedback* manner. The ultimate consequence of the process thus set in motion – a consequence neither foreseen nor intended by the human population – was domestication. As Flannery concluded in his paper:

The implications of this approach for the prehistoric are clear: it is vain to hope for the discovery of the first domestic corn cob, the first pottery vessel, the first hieroglyph, or the first site where some other major breakthrough occurred. Such deviations from the preexisting pattern almost certainly took place in such a minor and accidental way that their traces are not recoverable. More worthwhile

## PART II Discovering the Variety of Human Experience

would be an investigation of the mutual causal processes that amplify these tiny deviations into major changes in prehistoric culture. (Flannery 1968, 85.)

The systems approach is certainly convenient. It has, however, been criticized. The postprocessual archaeologists (see below) apply to it most of the criticisms that they make of processual archaeology in general: that it is scientific and mechanistic, that it leaves the individual out of account, and that systems thinking subscribes to the system of domination by which the elites of the world appropriate science to control the underprivileged. Criticisms from researchers who are not against scientific explanation in principle are particularly interesting. One of their most telling points is that the approach is ultimately descriptive rather than explanatory: that it imitates the world without really accounting for what happens within it. (But many would reply that to show how the world works is indeed one of the functions of explanation.) The critics also say that it is difficult in many cases to give real values to the various variables. They agree, however, that the approach does offer a practical framework for the analysis of the articulation of the various components of a society. And it does lend itself very readily to computer modeling and simulation (see next section). The models can become complicated, so that it is difficult to see the overall pattern. But that is the penalty when

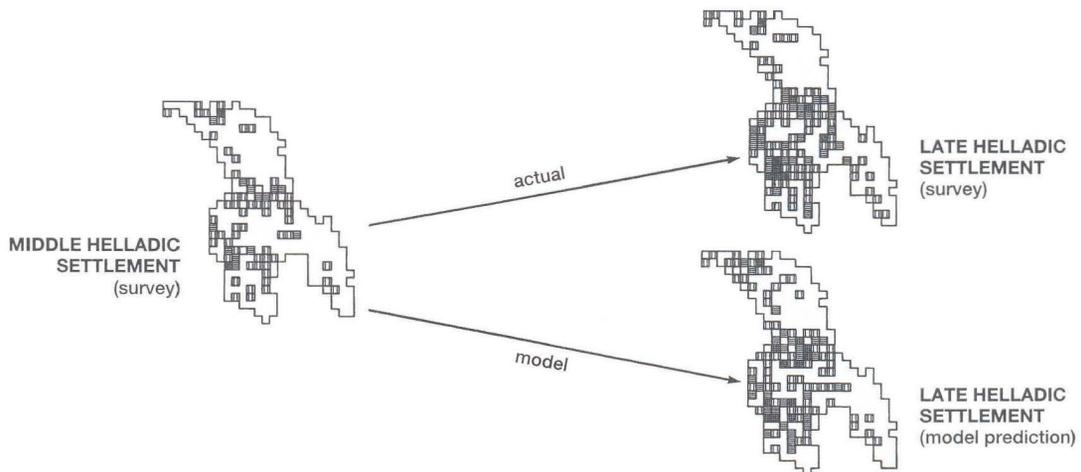
one is dealing with complicated systems like state societies, and difficult issues like the explanation of their emergence.

### Simulation

Simulation involves the formulation of a dynamic model: that is, a model concerned with change through time. Simulation studies are of considerable help in the development of explanations. To produce a simulation one must have in mind, or develop, a specific model that leads to a set of rules. One can then feed in some initial data, or some starting conditions, and through the repeated application of the model (generally with the aid of a computer) reach a series of system states, which may or may not carry conviction in relation to the real world.

A simulation is thus an exemplification, a working out (and sometimes a test) of a model that has already taken shape. In reality, of course, no simulation ever works perfectly first time, but from the experience of simulation one can improve the model. That then, is the principal value of simulation: the actual explanation is the model rather than the simulation itself.

As an example, A.J. Chadwick decided to model the development of settlement in Bronze Age Messenia in Greece. He took some very simple rules for the growth and development of settlement, and then used the



A.J. Chadwick's simulation of settlement growth in Bronze Age Messenia. The University of Minnesota Messenia Expedition had already mapped the distribution of settlement in Middle Helladic and Late Helladic times. The object of Chadwick's study was to see whether he could develop a simulation model which, if given the Middle Helladic pattern as the starting position, would then give rise to the Late Helladic pattern. The diagram shows the actual distribution of Middle and Late Helladic sites discovered by survey, together with the best fit simulation result, using a combination of environmental (e.g. soils) and human (e.g. density of existing occupation) factors. The intensity of shading indicates one, two, or three settlements, respectively, per  $2 \times 2$ -km cell.

computer to apply these to the landscape of prehistoric Messenia. The outcome is a set of simulated settlement patterns through time. Moreover, they have interesting resemblances with the real settlement patterns as we know they developed. The simulation thus clearly suggests that Chadwick's generative model was at least in part successful in seizing the essential of the settlement development process.

It is also possible to model the development of entire systems in this way, starting in essence from the systems approach outlined above. Here one analyzes the articulation or interplay of various subsystems. One then has to suggest precisely how these articulations might work in practice, how a change in the value of a parameter in one subsystem would alter the parameters in the other subsystems.

The simulation allows one to go through this in practice, starting from initial values for all the parameters, which one must oneself determine (or take from the real case). The System Dynamics modeling group at the Massachusetts Institute of Technology, led by Jay Forrester, has pioneered this technique in several fields, including the growth of towns and the future of the world economy. This simulation technique is generally in its infancy in archaeology, but there have been a few studies using it. For example, Jeremy Sabloff and his associates employed it to model the collapse of the Classic Maya civilization around AD 900,

building in their own assumptions and constructing their own model. The results were instructive in showing that the model could achieve plausible results (see box overleaf), though there have been new theories.

The American archaeologist Ezra Zubrow modified the Forrester approach and applied it to model the growth of ancient Rome from the period of the emperor Augustus. His aim was not to establish a complete simulated pattern of behavior for Rome, but to test which were the sensitive parameters that would have a crucial effect on growth and on stability. Some of Zubrow's results reveal a pattern of multiple cycles of sudden growth and decline, some three in 200 years. By undertaking different computer runs with different input variables (e.g. by doubling the size of the labor force), it is possible to see which changes would, according to the model, be highly significant. In fact, doubling the labor force did not have a major effect: doubling it again did.

This is an example where simulation is being used as an exploratory tool with which to investigate the behavior of the system. So far, with such simulations, work has been of a preliminary nature, and more has been learnt about the procedures and potentialities of simulation than of the early culture under study. Moreover simulation can set out to model decision-making by individuals, as Steven Mithen has done, and to model multi-agent interactions.

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## POSTPROCESSUAL OR INTERPRETIVE EXPLANATION

Since the mid-1970s, the early New Archaeology we have termed here functional-processual archaeology has come under criticism from several quarters. For example, early on it was criticized by Bruce Trigger in his book *Time and Tradition* (1978), who found the approach which sought to formulate explanatory laws (the nomothetic approach) too constraining. He preferred the historiographic approach, the broadly descriptive approach of the traditional historian. It was also criticized by Kent Flannery, who was scornful of the trivial nature of some of the so-called laws proposed and felt that more attention should be focused on the ideological and symbolic aspects of societies. Ian Hodder, likewise, felt that archaeology's closest links were with history, and wanted to see the role of the individual in history more fully recognized. Hodder also very validly stressed what he called "the active role of material culture," emphasizing that the artifacts and the material world we construct are not simply the reflections of our social reality that become embodied in the material record (by what Michael Schiffer would

call a C-transform: see Chapter 2). On the contrary, material culture and actual objects are a large part of what makes society work: wealth, for instance, is what spurs many to work in a modern society. Hodder goes on to assert that material culture is "meaningfully constituted," the result of deliberate actions by individuals whose thoughts and actions should not be overlooked.

Out of these criticisms, some archaeologists in Britain (notably Ian Hodder, Michael Shanks, and Christopher Tilley) and in the United States (in particular Mark Leone) formulated new approaches, overcoming some of what they saw as the limitations of functional-processual archaeology (and indeed much of traditional Marxist archaeology also), thereby creating the postprocessual archaeology of the 1990s. The postprocessual debate is largely over now, leaving behind a series of interesting (and sometimes mutually contradictory) approaches which together will shape the interpretive archaeologies of the early 21st century, operating alongside the continuing processual or cognitive-processual tradition. Among the influences

## THE CLASSIC MAYA COLLAPSE

Ever since the impressive remains of ancient states and cities were first discovered and studied by western scholars, the collapse of long-gone civilizations has been a focus of debate and inquiry. One of the first attempts to account for such a collapse was Gibbon's famous *Decline and Fall of the Roman Empire* (1776–88), in which he attributed the decline to the undermining effect of Christianity on Classical civilization. In the 1830s the explorations of Stephens and Catherwood in Central America led to the discovery of a then unknown civilization whose demise may have been as spectacular as that of Rome: the Maya.

The last 30 years have witnessed a number of theories seeking to account for the Classic Maya collapse in the 9th century AD, most of them based broadly on the concept of civilization as a system, and seeing collapse as the result of disequilibrium between different parts of the system.

### Evidence for a Collapse

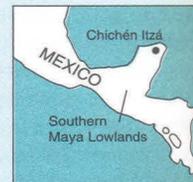
The first evidence for a crisis in the Maya lowlands came from the monumental record. Here the cessation of activity at each site could be dated with some accuracy, with the assumption that this represented the collapse of its ruling dynasty. Such failures in the Southern Lowlands began just after AD 800 and, although some centers clung to existence for a time, none survived to erect monuments beyond 909. Subsequent excavation demonstrated that there was a corresponding halt to major construction and building maintenance. The number of formal burials declined and the grave offerings were fewer and of lower quality. Demographic studies consistently showed that political disintegration coincided with a dramatic decline in population. This fall continued until, by the 10th century, the southern lowlands held only a fraction of the millions it once supported. During

the ensuing Postclassic period the homes of the former elite were re-occupied by squatters and simple pole-and-thatch houses were erected on the great ceremonial plazas. For a time there was a renaissance to the north, which saw rising populations and major construction, especially in the Puuc region and cities like Uxmal. However, this was shortlived and by the mid-10th century only Chichén Itzá continued elite traditions on any scale, and by now these were heavily modified by contact with Central Mexico.

### Causal Factors

If these were the effects of the collapse, what were the causal factors that lay behind it? In the absence of any definitive data scholars in the 1970s devised a variety of theoretical models, in some cases constructing computer simulations to test them. While early explanations had emphasized single factors, whether epidemic disease, drought, peasant revolt, foreign invasion, etc., there was a growing recognition that the collapse must be viewed as a system failure, with a number of contributing factors. It was also widely accepted that since the highest populations and most conspicuous signs of cultural florescence directly preceded the collapse, the very same processes that had created one had led to the other.

There was a broad division between those modeling a system failure and those emphasizing a greater element of social conflict. In the former, rising populations forced the society into more intensive forms of agriculture. In the short term, yields increased and allowed the rise in population to escalate, but such methods over-exploited the soils and were not sustainable. The result was falling yields exactly when demand was at its greatest. At the very least, a subsistence system under such stress would have been especially vulnerable to crop diseases or drought.



On the social front, a percentage increase of the elite class (who would reproduce more successfully than the less well-nourished peasantry) led to social imbalance and ever greater demands on the lower orders. Competition between elite groups would have expressed itself in larger and more magnificent construction projects and production was increasingly funneled into such activity and away from basic farming. This ultimately led to social strife and disintegration.

There was also work on the impact of trade, seen either in terms of a technological shift from riverine to sea-going transport that took routes away from the southern lowlands, or competition between the Maya and better-organized traders in Mexico. Our very poor understanding of Maya economics hampers any reconstruction of this kind.

### Lowe

One of the most recent simulations of the Classic Maya collapse is that by John Lowe (see diagram opposite). His work is based on the chronological patterning of the collapse, as determined from the latest dates of monument construction at different Maya centers. From this Lowe reconstructs a collapse which started in the peripheral areas and moved inward, with sites in the northeast being the last to feel the effects. By correlating this pattern with site density and site hierarchy, Lowe is led to the conclusion that it was population pressure coupled with a top-heavy elite administration which precipitated the collapse.

The basic mechanism was pressure on land creating the need for more intensive agriculture, which in turn



After the collapse of the Southern Lowlands there was a brief florescence to the north, especially at Uxmal and fellow centers in the Puuc region. However, the Northern Lowlands did not escape the crisis that swept the south and these centers were abandoned in the early 10th century. Chichén Itzá (above, the Castillo pyramid) survived for a while longer, though under strong Mexican influence.

placed greater demands on the ruling elites for the regulation of food distribution and the allocation of manpower. Competition within and between the elites themselves placed still further strains on the system, requiring increasing labor inputs for the construction of ceremonial monuments.

The model owes much to earlier work, such as that of Willey and Shimkin, and Hosler, Sabloff, and Runge. It is, however, the most thorough attempt so far to account for the details of the Classic Maya collapse

within a systems framework.

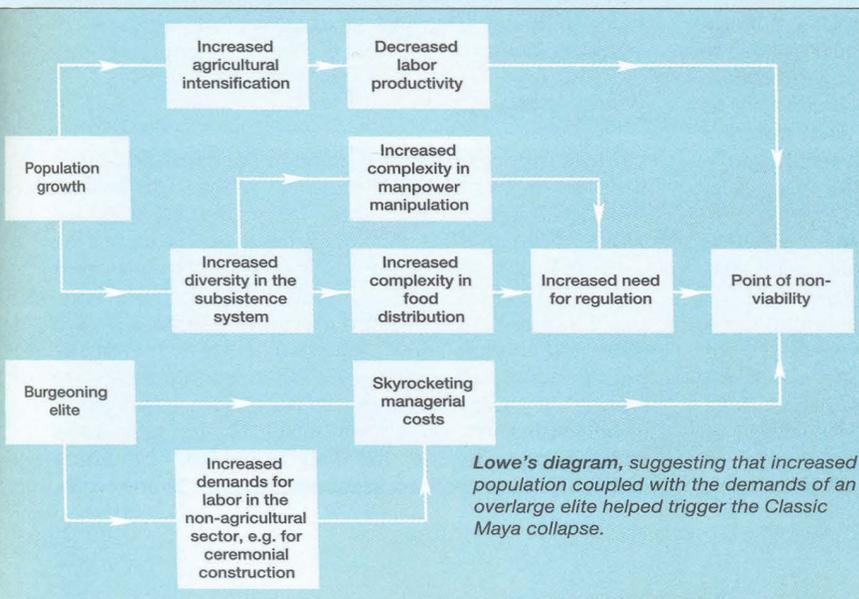
#### Current Understanding

Mayanists have continued to collect relevant data and shape research projects around the collapse problem. In some cases it has been possible to introduce new methodologies and thereby expand the variety of available data. A detailed examination of the energetics of ancient Maya building technology has countered the idea that monumental construction was a major drain on labor and resources. Firm

evidence of increased social strife has been produced in the Southern Lowland Petexbatun region, where the last years of occupation show hurriedly built defenses.

While there is some regional variability, many recent studies support the view of ecological over-exploitation. Pollen from lake sediments has provided evidence for deforestation, while changes in the chemical composition of such deposits (reflecting run-off from the surrounding terrain) points to soil erosion and infertility. Skeletal analysis has produced evidence for accompanying malnutrition, disease, and infant mortality. Sediments from the northern Lake Chichancanab have produced shells whose oxygen isotope make-up reveal a severe drought between AD 750 and 900 (the driest period in Central America for 6000 years).

While Maya collapse continues to pose interpretive problems, our understanding is undoubtedly improving. There is much support now for "overshoot," the effect by which a highly successful system reaches and then exceeds its ecological limits. While the evidence for social turmoil is patchy, few doubt that the dying days of the Classic Period were a calamitous time for all.



## PART II Discovering the Variety of Human Experience

contributing to these interpretive archaeologies are:

- neo-Marxism (Althusser, Balibar, Lukacs)
- the “post-positivist” (anarchic) view of scientific method advocated by Feyerabend
- the structuralism of Claude Lévi-Strauss
- the phenomenological approach of Ernst Cassirer and Martin Heidegger
- the hermeneutic (interpretational) approach initiated by Dilthey, Croce, and Collingwood and developed more recently by Ricoeur
- Critical Theory as developed by philosophers of the Frankfurt School (Marcuse, Adorno) and by Habermas
- the post-structuralism (deconstructionism) of Barthes, Foucault, and Derrida
- structuration theory as exemplified by Giddens, and the approach of Bourdieu
- feminist approaches to archaeology (pp. 46–47, 218–22).

### Structuralist Approaches

Several archaeologists have been influenced by the structuralist ideas of the French anthropologist Claude Lévi-Strauss, and by the advances in linguistics of the American Noam Chomsky. Structuralist archaeologists stress that human actions are guided by beliefs and symbolic concepts, and that the proper object of study is the structures of thought – the ideas – in the minds of human actors who made the artifacts and created the archaeological record. These archaeologists argue that there are recurrent patterns in human thought in different cultures, many of which can be seen in such polar opposites as: cooked/raw; left/right; dirty/clean; man/woman, etc. Moreover, they argue that thought categories seen in one sphere of life will be seen also in other spheres, so that a preoccupation with “boundedness” or boundaries, for instance, in the field of social relations is likely to be detectable also in such different areas as “boundedness” visible in pottery decoration.

The work of André Leroi-Gourhan in the interpretation of Paleolithic cave art (box, pp. 392–93) was a pioneering project using structuralist principles. For this attempt at the interpretation of depictions of animals the approach seems particularly appropriate. In another example, the American archaeologist Dean Arnold has used the structuralist assumption that human thought categories in one field of experience are related to those in others in his study of the village of Quinua, near Ayacucho in Peru. Here he sought to relate the design elements on the pottery produced and used in the village to aspects of social patterning

within the community, and to the community’s perception of its own environment. Arnold studied 172 vessels of four different shapes with particular reference to the organization of design elements. He looked at the division of the surface of each pot into areas, and the use of the patterns of symmetry, and the variability of the motifs within the design zones. He then considered the organization of space within the landscape surrounding the village, and the social divisions governed by kinship categories. He was able to summarize the relationship of spatial organization and decorative space as shown in the accompanying table.

It should be noted that like most structuralist arguments the analysis is not concerned with change through time: it is synchronic. A more telling question that the skeptic might pose, however, is whether there is any necessary relationship between the decorative principles detected for pottery, and the other superficially unrelated concepts involved in kinship and in describing the landscape. It is at this point that the processual archaeologist, perhaps to the irritation of the structuralist, would wish to investigate whether there are any hypotheses here that would be open to testing.

Another influential structuralist study is the work of the folklore specialist Henry Glassie on folk housing in Middle Virginia, USA. In it he uses such structuralist dichotomies as human/nature, public/private, internal/external, intellect/emotion, and applies them in a detailed way to the plans and other features of houses mainly of the 18th and 19th centuries AD. As he is working primarily from material culture with only limited reference to written records, his work is certainly relevant to archaeological interpretation. But whether his interpretations would seem so plausible if he were not able to claim that his subject matter belongs to the same cultural tradition as that within which he is working is another matter.

### Critical Theory

Critical Theory is the term given to the approach developed by the so-called “Frankfurt School” of German social thinkers, which came to prominence in the 1970s. This stresses that all knowledge is historical, distorted communication, and that any claims to seek “objective” knowledge are illusory. By their interpretive (“hermeneutic”) approach these scholars seek a more enlightened view, which will break out of the limitations of existing systems of thought. For they see research workers (including archaeologists) who claim to be dealing in a scientific way with social matters as tacitly supporting the “ideology of control” by which domination is exercised in modern society.

SPATIAL ORIENTATION	COMMUNITY PATTERN	DECORATIVE SPACE	VESSEL SHAPE	
Vertical	Vertical set of ecological zones	Set of vertically arranged decorative zones on vessels with vertically arranged space	<i>puyñu</i> <i>yukupuyñu</i>	<p>UPPER BORDER ZONE A LOWER BORDER ZONE A ZONE C ZONE B ZONE D</p> <p><i>puyñu</i></p>
Horizontal	Division of savannah into upper and lower zones based on the complementary functions of the irrigation system	High frequency use of bilateral symmetry for motifs	All except the <i>tachu</i>	<p>UPPER BORDER ZONE A LOWER BORDER ZONE A ZONE A ZONE C ZONE B ZONE D</p> <p><i>yukupuyñu</i></p>
		Bifurcation of space by a vertical plane created by two narrow bands	<i>tachu</i>	
		Mirroring of color and shape of framing lines on bands	<i>tachu</i>	
		High frequency use of vertical reflection to form band patterns	All except the <i>tachu</i>	
Vertical	Division of savannah into two barrios based on the irrigation system	Use of horizontal reflection in conjunction with vertical reflection as the second most prominent band pattern	All except the <i>tachu</i>	<p>ZONE A ZONE B</p> <p><i>tachu</i></p>
Horizontal	Bilateral membership of individuals (the smallest unit of social space in the community) in each of two descent groups	Predominance of bilateral symmetry for production of motifs (the smallest unit of design space in the community)	All except the <i>tachu</i>	<p>ZONE B ZONE A ZONE C</p> <p><i>plato</i></p>
		Social classes: higher class in the village, lower class in the rural area	Inner versus outer spatial organization	

Dean Arnold's structuralist analysis of the relationship of spatial organization and decorative space in Quinua, Peru.

## EXPLAINING THE EUROPEAN MEGALITHS

A longstanding issue in European prehistory is that of the so-called megalithic monuments. These are impressive prehistoric structures built of large stones ("megalith" comes from the Greek *megas* [great] and *lithos* [stone]). In general, the stones are arranged to form a single chamber, buried under a mound of earth and entered from one side. The chambers may be large with a long entrance passage. Human remains and artifacts are usually found within these structures, and it is clear that most served as collective burial chambers, i.e. tombs for several people.

Megalithic monuments of various kinds occur widely along the Atlantic coasts of Europe. They are also found inland over most of Spain, Portugal, and France, but in other countries they do not occur more than about 100 km (65 miles) from the coast, and in general they are not present in central and eastern Europe. Most megaliths belong to the Neolithic period – the time of the first farmers. By the beginning of the Bronze Age they were going out of use in most areas.

Many questions arise. How were the Neolithic inhabitants of western Europe able to erect these great stone

monuments? Why are they not found in other areas? Why were they built at this time and not earlier or later? What is the explanation for the range and variety of forms that they show?

### Migrationist and Diffusionist Explanations

In the 19th century megaliths were seen as the work of a single group of people, who had migrated to western Europe. Many of the explanations were offered in racial terms. But even when distinctions of race were not drawn, the explanations remained ethnic: a new population of immigrants was responsible.

In the early 20th century alternative explanations were offered in terms of the influence of the higher civilizations of the eastern Mediterranean on those of the barbarian west. Trading links and other contacts between Crete and Greece on the one hand, and Italy and perhaps Spain on the other were credited with the responsibility for a flow of ideas. Thus the custom of collective burial in built tombs seen in Crete around 3200 BC was thought to have been transmitted to Spain within a couple of centuries. From there it would have spread through the workings of diffusion. This view carried with it the idea that the megaliths of Spain and Portugal and then those of the rest of Europe must be *later* than those of Crete.

### Functional-processual Explanation

Radiocarbon dating made it clear that the megalithic tombs of western Europe were in many cases earlier than those of Crete. Now it was suggested that local communities had developed their own practices for the burial of the dead. A good processual explanation had to account for such a development in terms of the local social and economic processes at work.

Renfrew proposed (see box, Early Wessex, pp. 198–99) that in the

Neolithic period in many areas the settlement pattern was one of dispersed egalitarian groups. Each communal tomb would serve as a focal point for the dispersed community, and would help to define its territory. The megaliths were seen as the territorial markers of segmentary societies.

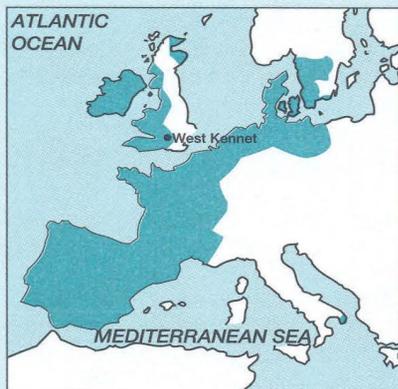
A related idea was introduced by the British archaeologist Robert Chapman, drawing on the work of the American Arthur Saxe: that formal disposal areas for the dead (e.g. tombs) occur in societies where there is competition for land ownership. To be able to display the family tomb containing the bones of ancestors would legitimize one's claim to own and use the ancestral lands within the territory.

This explanation may appropriately be termed "functionalist" because it suggests how the tombs have served a useful function, in social and economic terms, within the society.

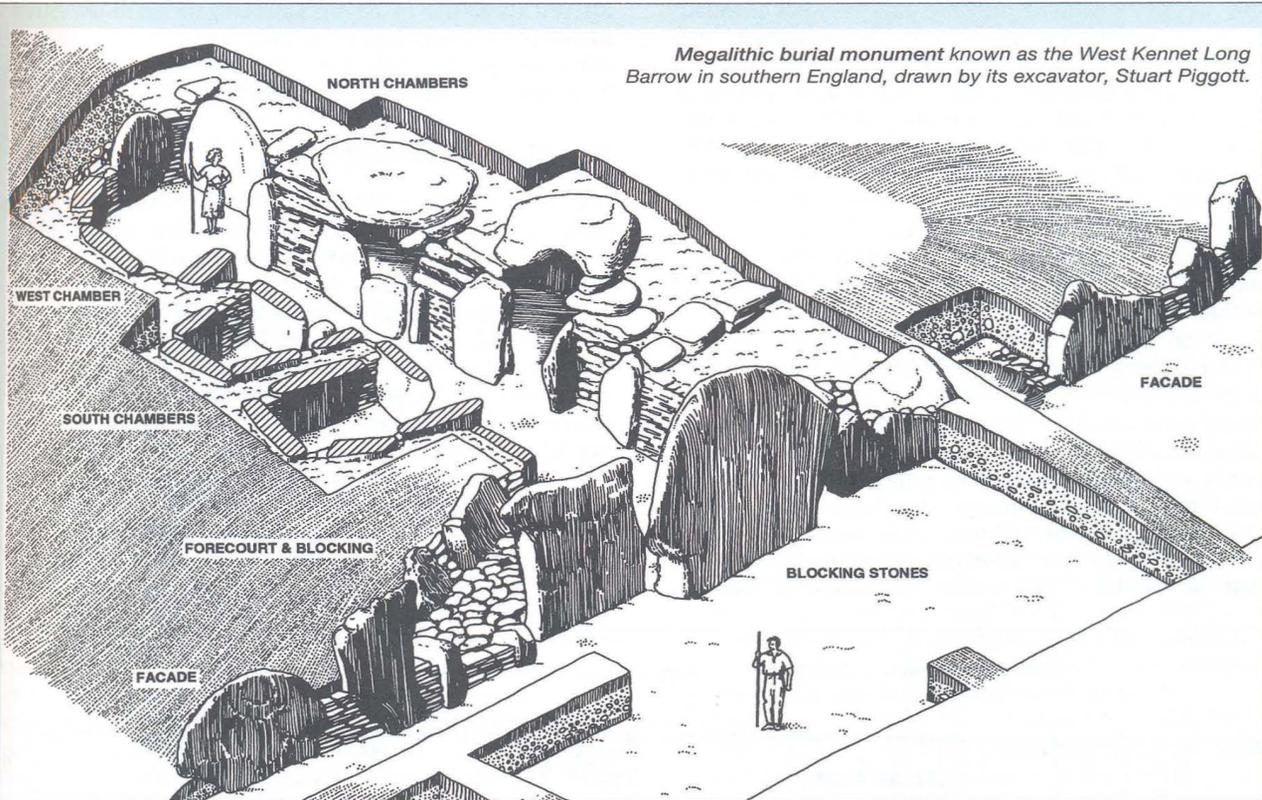
### Neo-Marxist Explanation

In the early 1980s Christopher Tilley developed an account of the Middle Neolithic megaliths of Sweden, which (like the processual one) emphasized local factors. He saw such monuments as related to the exercise of power within these small societies by individuals who used the rituals associated with megaliths as a means of masking the arbitrary nature of control and of legitimizing inequalities within society. The mixing of body parts of different individuals within a tomb emphasized the organic wholeness of society, taking attention away from the inequalities in power and status which actually existed. The tombs and the rituals made the established order seem normal or natural.

The emphasis in Tilley's explanation on dominance within the group is typically Marxist, while that on ritual and ideology masking the underlying contradictions is typical of neo-Marxist thought.



Distribution of megalithic monuments in western Europe.



*Megalithic burial monument known as the West Kennet Long Barrow in southern England, drawn by its excavator, Stuart Piggott.*

### Postprocessual Explanation

Ian Hodder, in criticizing both the processual and the neo-Marxist standpoints, has stressed symbolic aspects. He argues that earlier explanations have failed adequately to consider the particularity of the historical contexts in which the megaliths are found. And he argues that without consideration of the specific cultural context one cannot hope to understand the effects of past social actions.

Hodder maintains that many of the chamber tombs of western Europe referred symbolically to earlier and contemporary houses in central and western Europe: "the tombs signified houses." As he puts it: "the way megaliths were involved actively in social strategies in western Europe depended on an existing historical context. The existence of the tombs can only be adequately considered by

assessing their value-laden meanings within European society" (Hodder, 1984, p. 53). Hodder brings into the argument a number of further issues, including the role of women in the societies in question. His aim is to arrive at some sort of insight for the meaning that the tomb in a specific context held for those who built it.

Alasdair Whittle has questioned whether the builders of the monuments were farmers, arguing that the impulse which transformed society at this time was not economic or demographic (i.e. farming) but ideational, and that the techniques of farming were widely adopted only later: this might seem to be pushing the postprocessual standpoint to an extreme.

### Comparison

The functional-processual, neo-Marxist, and postprocessual

explanations all lay greater stress on internal factors. But are they in conflict with one another? We suggest that in fact they are not, and that all three could be operating simultaneously.

The processual idea that the monuments were useful to society in serving as territorial markers, and as the ritual focus of territorial belief and activity, does not necessarily contradict the Marxist view that they were used by the elders to manipulate the members of the society into the continued recognition of their social status.

And neither of these ideas need contradict the view that in particular contexts there were specific meanings for the tombs, and that the rich variety of the megalithic tombs needs to be considered further, as interpretive archaeologists of the "Neo-Wessex school" have continued to do (see p. 216).

## PART II Discovering the Variety of Human Experience

This overtly political critique has serious implications for archaeology. For the philosophers of this school stress that there is no such thing as an objective fact. Facts only have meaning in relation to a view of the world, and in relation to theory. Followers of this school are critical of the criterion of testing as used by processual archaeologists, seeing this procedure as merely the importing into archaeology and history of “positivistic” approaches from the sciences. These views have been advanced by Ian Hodder in his book *Reading the Past* (1991) and by Michael Shanks and Christopher Tilley in their work *Re-Constructing Archaeology* (1987). They call into question most of the procedures of reasoning by which archaeology has hitherto operated.

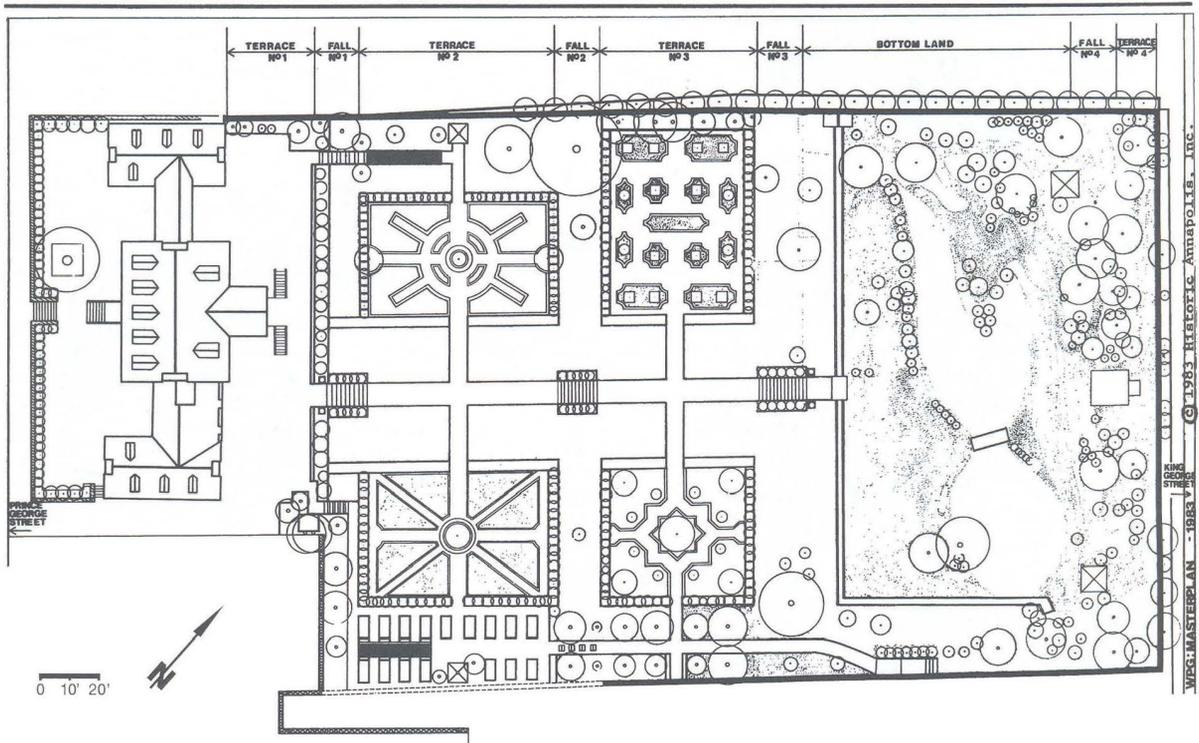
The processualists’ response to these ideas is to point out that to follow them seems to imply that one person’s view of the past is as good as another’s (so-called “relativism”), without any hope of choosing systematically between them. This would open the way to the “fringe” or “alternative” archaeologies discussed in Chapter 14, where explanations can be

offered in terms of flying saucers, or extra-terrestrial forces or any phantasms which the human mind may conjure up. It is not entirely clear how the Critical Theorists can answer this criticism.

### Neo-Marxist Thought

One feature of neo-Marxist (“structuralist Marxist”) thought, as noted earlier, is to stress that the ideological superstructure should not be assumed to be subordinate to the economic base of society. This opens the way to a much greater emphasis on the significance of ideology in shaping change in early societies.

One example is offered by the work of Mark Leone at Annapolis in Maryland, as part of a research project concerned with establishing a deeper historical identity for the area. His example is the 18th-century garden of William Paca, a wealthy landowner: the garden has been studied archaeologically and has now been reconstructed. Leone uses the neo-Marxist concept of ideology: “Ideology takes social relations and makes them appear to be resident in nature or history: which



Reconstructed plan of the garden in Annapolis, Maryland, of the 18th-century landowner William Paca. Mark Leone and his colleagues were concerned to show how Paca’s position of power “was placed in law and in nature...in practicing law and in gardening.” The outlines of the garden are archaeologically derived, but the terraces and most of the plantings are conjectural.

makes them apparently inevitable.... Thus the class or interest group which controls the use of precedent does so to insure its own interests. It is in this sense that the classic Marxist writers have said that history tends to be written for class purposes.” (Leone 1987, 26)

Leone examines the Annapolis garden in detail, and emphasizes the contradiction represented between a slave-owning society and one proclaiming independence in order to promote individual liberty, a contradiction seen also in Paca’s life. “To mask this contradiction,” Leone writes, “his position of power was placed in law and in nature. This was done both in practicing law and in gardening.”

This neo-Marxist outlook has its echo in the emerging local archaeologies of some Third World countries, where there is an understandable desire to construct

a history (and an archaeology) that lays stress on the local population and its achievements before the colonial era.

But some archaeologists, embracing also the relativist outlook encouraged by Critical Theory, have suggested that the archaeological *methods* used in those countries should also be different. They suggest that the whole framework of archaeological reasoning built up over the past century (and, let us admit, built up mainly in the western world) may have to be set aside. Certainly one must face the reality that different systems of values are at work, as is indicated by the controversy in North American archaeology over whether or not Native Americans should have control over the excavated remains of their ancestors (see Chapter 14).

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## COGNITIVE-PROCESSUAL ARCHAEOLOGY

During the 1980s and 1990s a new perspective emerged, which transcends some of the limitations of functional-processual archaeology of the 1970s. This new synthesis, while willingly learning from any suitable developments in postprocessual archaeology, remains in the mainstream of processual archaeology. It still wishes to explain rather than merely describe. It still emphasizes the role of generalization within its theoretical structure, and stresses the importance not only of formulating hypotheses but of testing them against the data. It rejects the total relativism that seems to be the end point of Critical Theory, and it is suspicious of structuralist (and other) archaeologists who claim privileged insight into “meaning” in ancient societies, or proclaim “universal principles of meaning.” To this extent, it does not accept the revolutionary claims of postprocessual archaeology in rejecting the positive achievements of the New Archaeology. Instead, it sees itself (although its critics will naturally disagree) in the mainstream of archaeological thinking, the direct inheritor of the functional-processual archaeology of 20 years ago (and the beneficiary of Marxist archaeology and various other developments).

Cognitive-processual archaeology differs from its functional-processual predecessor in several ways:

- 1 It seeks actively to incorporate information about the cognitive and symbolic aspects of early societies into its formulations (see below).
- 2 It recognizes that ideology is an active force within societies and must be given a role in many explanations, as neo-Marxist archaeologists have argued, and that ideology acts on the minds of individuals.

- 3 Material culture is seen as an active factor in constituting the world in which we live. Individuals and societies construct their own social reality, and material culture has an integral place within that construction (see box overleaf), as effectively argued by Ian Hodder and his colleagues.
- 4 The role of internal conflict within societies is a matter to be more fully considered, as Marxist archaeologists have always emphasized.
- 5 The earlier, rather limited view of historical explanation being entirely related to the human individual, indeed of being often anecdotal, should be revised. This point is well exemplified in the work of the French historian Fernand Braudel, who considered cyclical change and underlying long-term trends.
- 6 It can take account of the creative role of the individual without retreating into mere intuition or extreme subjectivity by the philosophical approach known as methodological individualism.
- 7 An extreme “positivist” view of the philosophy of science can no longer be sustained: “facts” can no longer be viewed as having an objective existence independent of theory. It is also now recognized that the formulation of “laws of culture process” as universal laws like those of physics is not a fruitful path towards explanation in archaeology.

This last point needs further discussion. Philosophers of science have long contrasted two approaches to the evaluation of the truth of a statement. One approach evaluates the statement by comparing it with relevant facts, to which, if true, it should correspond (this is

# THE INDIVIDUAL AS AN AGENT OF CHANGE



Steven Mithen has argued in his *Thoughtful Foragers*, which considers hunter-gatherers, that a “focus on the individual decision makers is the stance for developing adequate explanations in archaeology.” John Barrett, in his study of the British Neolithic and Early Bronze Age periods, *Fragments from Antiquity*, stresses that the perceptions and beliefs of individuals are an integral part of the social reality, without which culture change cannot adequately be understood. A cognitive approach (as discussed in Chapter 10) is therefore seen as indispensable to an understanding of change. Kent Flannery has recently stressed the role of the individual as actor in the historical drama with reference to the formation of state societies, drawing upon such historically documented examples as the formation of the Zulu state in South

Africa and of state society in Hawaii under the leadership of Kamehameha I.

A good example of an approach incorporating individual actions and their symbolic context is provided by John Robb’s study of change in prehistoric Italy, where indications of personal inequality, in terms of age, of gender, and of prestige are carefully considered, and the evidence for the elaboration of a male gender hierarchy toward the beginning of the Bronze Age is examined.

As he points out, the rock engravings found in the Alps at Monte Bego and Val Camonica (compare the Swedish rock engravings discussed in the box, p. 418) employ images which stand for certain specific concepts: the association and repetition of male hunters, male plowers, cattle, and daggers suggest that these symbols

	figure	icon
social maleness	male	dagger
hunting/capture of stag	stag	antlers
plowing/mastery of oxen	ox	horns

were primarily used to enact and express male gender.

Robb draws on recent theories of social change which argue that, although an individual’s actions are structured by the social system in which they live, specific actions also construct, reconstitute, and change that social system. In other words, social systems are both the medium and the outcome of people’s actions.

On the basis of evidence drawn from cult caves, burials, and human representations such as figurines, Robb concluded that during the Neolithic in Italy (c. 6000–3000 BC), society probably contained “balanced, complementary cognitive oppositions between male and female.” As Ruth Whitehouse points out, cult caves appear to have been used by both women and men, although only male activities seem to be represented in the innermost areas. Burials are simple inhumations located within villages and without grave-goods. Commonly, however, males are placed on their right side and females on their left. The extant figurines of this period are dominated by female images. Taken together, these strands of evidence suggest that, although gender distinctions were important in Neolithic society, gender hierarchy was not present.



An example of a rock carving from Val Camonica, northern Italy, showing a stag with prominent antlers being hunted by a male figure holding a spear, and possibly a dog.

**Changes in the Bronze and Iron Age**  
The balanced gender oppositions of the Neolithic were transformed in the Copper and Bronze Ages (after 3000 BC) into a gender hierarchy which valued male above female. The main evidence for this change is drawn from art. Female figurines disappear; on stelae, monumental stone representations of schematic human figures, males are identified by cultural icons, mainly daggers, while females are identified by breasts. In other art

forms three new dominant themes appear: weaponry, especially males with daggers; hunting images, particularly stags identified by antlers; and plowing, with oxen identified by horns. This consistent association of male form with male cultural icon – men/daggers; stags/antlers; oxen/horns – builds a symbolic system used to enact and express male gender from which an ideology of male power and vitality is created. At the same time, women, by their lack of representation or association with cultural icons are left naturalized and culturally unvalued. Robb cautions, however, that male gender symbols may be telling only one side of a complex gender situation.

During the Iron Age (after 1000 BC), the gender hierarchy of the Bronze Age became a class-based hierarchy. This was achieved by transforming a generalized ideology of male potency into one of aristocratic warrior prowess complemented by a new female elite. Again art works and burials are the main sources of evidence.

Grave-goods placed in male burials now include swords, shields, and military rather than simple daggers, while stelae and depictions in rock art favor warfare rather than the earlier hunting and plowing imagery. Ornamentation and spindle whorls appear in female graves, and females depicted on stelae are culturally marked by dress and finery – not simply breasts. These finds suggest the expansion also of the female symbolic register to express class distinctions.

Robb in his study does not claim to account for the origins of gender inequality, but he does throw light on the development of society in prehistoric Italy. Drawing on concepts of meaning and social action, he shows how gender symbolisms may have motivated males to participate in diverse and changing institutions such as hunting, warfare, economic intensification, and trade, and how these institutions reproduced gender ideology. He does so without any retreat into relativism and without relying on mere empathetic “understanding.”

called the *correspondence* approach). The other approach evaluates the statement by judging whether or not it is consistent with (or coherent with, hence *coherence* approach) the other statements that we believe to be true within our framework of beliefs.

Now, although it might be expected that the scientist would follow the first of these two procedures, in practice any assessment is based on a combination of the two. For it is accepted that facts have to be based on observations, and observations themselves cannot be made without using some framework of inference, which itself depends on theories about the world. It is more appropriate to think of facts modifying theory, yet of theory being used in the determination of facts:



Cognitive-processual archaeologists, like their functional-processual predecessors, believe that theories must be tested against facts. They reject the relativism of the Critical Theory and postprocessual archaeology of the 1990s, which seem to follow entirely a coherence view of truth. But they accept that the relationship between fact and theory is more complicated than some philosophers of science 30 years ago recognized. Cognitive-processual archaeology at present appears to be exploring two main directions: investigation of the role of symbols within processes of change, and exploration of the structure of transformations.

## Symbol and Interaction

The point has already been made that the early New Archaeology aspired to investigate social structures, and the progress already made in that direction was reviewed in Chapter 5. But it was slow to explore symbolic aspects of culture, which is why cognitive-processual archaeology is a recent development.

The role of religious ritual within society has been investigated in a new way over the past 20 years by the cultural anthropologist Roy Rappaport. Instead of seeking to immerse himself in the agricultural society in New Guinea under study, becoming totally familiar with the meanings of its symbolic forms, he followed instead a strategy of distancing himself – of looking at the society from the outside, at what it actually does (not what it says it does) in its ritual behavior. This position is a convenient one for the archaeologist who

is always outside the society under study, and unable to discuss issues of meaning with its participants. Rappaport has studied the way ritual is used within society and his focus is on the functioning of symbols rather than on their original meaning. His work influenced Kent Flannery, one of the few of the original generation of New Archaeologists to concern himself in detail with symbolic questions. The book written by Joyce Marcus and Kent Flannery, *Zapotec Civilization* (1996), is one of those rare archaeological studies where symbolic and cognitive questions are integrated with subsistence, economic, and social ones to form an integrated view of society. This huge project is described in detail in Chapter 13.

Quite clearly religion and other ideologies such as modern Communism have brought about great changes, not just in the way societies think but in the way they act and behave – and this will leave its mark in the archaeological record. The whole field of official symbolism, and of religious symbolism within it, is now the focus of archaeological research in several parts of the world.

Postprocessual or interpretive archaeology has not shown itself adept at explaining classes of events or general processes (see p. 462, “What are we trying to explain”), since the focus in postprocessual thought is upon the specific conditions of the context in question, and the validity of wider or cross-cultural generalizations is not accepted. Cognitive-processual archaeology on the other hand is very willing to generalize, and indeed to integrate the individual into the analysis as an active agent as Kent Flannery again has done in a recent study.

Two recent works in the mainstream processual tradition exemplify well the emphasis that is now placed upon the cognitive or ideational dimension. Timothy Earle in *How Chiefs Come to Power* (1997), drawing upon the work of the sociologist Michael Mann, devotes successive chapters to economic power, military power, and ideology as a source of power, utilizing three widely separated case studies situated in Denmark, Hawaii, and the Andes. And in a recent collective work devoted to archaic states (Feinman and Marcus, 1998) and likewise treating the subject within a comparative perspective, Richard Blanton has examined the sources of power in early states, contrasting the “cognitive-symbolic base of power” with what he terms the “objective base of power.” The terminology may not be entirely appropriate – for who is to adjudicate upon the boundaries of the objective? – but the effect is to integrate the cognitive dimension fully into the analysis, alongside economic issues, rather than treating it as a mere epiphenomenon as was common

in the days of the functional-processual approach. In such works the limitations of the earlier processual archaeology have been transcended and the roots of change are investigated in a generalizing context with full weight being given to the cognitive and the symbolic dimensions.

## **The Structure of Transformations**

The role of symbols within processes of change is one current focus of much research; another, of rather a different kind, is on the processes of change themselves. By what means do social forms change? How is growth sustained? What determines the new structures that emerge?

Contemporary archaeology has sought inspiration from disciplines where questions of growth and form have been systematically considered for some time: for instance from evolutionary biology, from the mathematics of non-linear systems, and from the general study of non-equilibrium systems. It is appropriate here to say a brief word about each.

**Positive Feedback.** In the early days of systems analysis in archaeology it was argued by some that a functioning system maintained itself in relation to its environment in a position of stability or homeostasis through the operation of negative feedback. Essential changes within the system were thus seen as homeostatic changes (through negative feedback) in response to changes of external origin. As noted above, systems thinking is now very much at home with the notion of positive feedback as a cause of the growth of new forms (morphogenesis).

**Punctuated Equilibria.** One of the problems within archaeology, as within evolutionary thinking in general, has been to accommodate the notion of sudden change. Much of the thinking of Charles Darwin in *The Origin of Species* (1859) was toward the explanation of changes taking place over long periods of time. It is only relatively recently, notably through the work of Stephen Jay Gould and Niles Eldredge (1977), that it has been accepted that sudden change is not in contradiction to Darwinian thought. It is now believed by many evolutionary biologists that there were long time periods when plant and animal species changed very little, and much shorter periods (“punctuations”) when evolution progressed at a very rapid rate.

This general lesson is certainly applicable to archaeology, and the British archaeologist John Cherry has argued, in relation to the emergence of the palace society of Minoan Crete, that a gradualist approach does

not seem appropriate. Inspired by the concept of “punctuated equilibria,” he maintains that the sudden emergence of palace society may nonetheless be accommodated within an evolutionary perspective; the impact of gradual change over a period of more than a thousand years led to a rapid reordering of Minoan society at the end of the 3rd millennium BC.

**Catastrophe Theory and Chaos Theory.** Similar lessons are offered by catastrophe theory, a branch of mathematics which is employed to argue that when a number of variables are working together (in a non-linear way), gradual changes in the variables can produce sudden effects. Moreover, René Thom, in his *Structural Stability and Morphogenesis* (1975), was able to show that there are only a limited number of ways in which such changes can take place. These he describes as the elementary catastrophes, of which one has been applied to archaeological cases.

**Self-Organization in Non-Equilibrium Systems.** Using a related perspective, derived initially from thermodynamic studies in chemistry, the Belgian scientist Ilya Prigogine has stressed that many systems, and specifically those that are not at equilibrium and in which energy is dissipated, have a propensity towards self-organization. That means new and more complex forms emerge quite naturally within them. The paths or trajectories of growth arrive at bifurcation points at which sudden changes may occur.

These ideas, like those of Catastrophe Theory, have been of great interest to theoretical biologists. They have also been applied to the human sphere. For instance, Prigogine’s colleague P.M. Allen has simulated the growth of urban centers using this approach, showing how the growth of new and more complex

forms may be predicted. Taking into account such factors as industry, population, and retail trade, he modeled the development of a small town into a city, showing how the location of different activities within the city shifted as population grew and external demands of the industrial and financial sectors expanded.

These various approaches have not yet been comprehensively applied in the field of archaeology, although in each case the application has begun, and they have been applied by van der Leeuw and McGlade to an ambitious field project in the Mediterranean. At present, the models are in general too simple, and most of them fail to take into account the cognitive features to which the cognitive-processual archaeology aspires. Postprocessual archaeologists have argued that such approaches are too mechanistic to account for the richness and complexity of human behavior. In the simple forms in which such models exist at present, that criticism is certainly justified. But already computer scientists such as J.E. Doran are devising simulations where individuals within a community, each with different perceptions of the world, will interact.

One of the aspirations of cognitive-processual archaeology is to develop more effective formal models within which human perceptions and the symbolic side of human society will have a significant role. Modeling of this kind is, however, a specialized field. Most archaeologists will prefer to proceed in the first place from the archaeological material, and to frame their explanations initially in verbal rather than mathematical form.

Cognitive-processual archaeology offers an appropriate framework for the development of such explanations. It is a framework in which the specifically human qualities of the human animal – the symbolic – will play a central role.

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## SUMMARY

One of the cornerstones of the New Archaeology was an emphasis on the importance of theory in archaeology. For too long scholars had felt it sufficient to explain the past simply in terms of archaeological cultures interpreted as the remnants of distinct groups of people, who experienced change as a result of migrations and diffusion from other cultures. The New Archaeology seriously questioned the equation of cultures with peoples, and challenged the assumption that diffusion – even in the rare cases where it could be proved to have occurred – actually explained the underlying causes of change in societies. New Archaeologists sought to study societies as functioning cultu-

ral systems, and to find regularities in the culture-historical process.

In this functional-processual approach, any new hypotheses derived from archaeological evidence were to be tested against fresh evidence – the hypothetico-deductive method. Marxist archaeologists likewise attempted to understand the processes of change in history, but tended to limit their explanations of change in terms of the struggle between social classes.

In any explanation, it is important to be clear about what one is trying to explain – whether a specific event, a class of events, or a more general process. Two classes of events addressed by the New Archaeology

## PART II Discovering the Variety of Human Experience

have been the rise of agriculture and the origins of the state. Here, the most successful explanations appear to be multicausal ones using the systems approach, which allows the use of computer simulation and modeling.

From the 1970s on structuralists, poststructuralists, and then postprocessualists reacted against the functionalism of the early New Archaeology, advocating greater emphasis on the ideas and the beliefs of past societies, and criticizing the procedure of testing, since all knowledge is subjective. Processualists have

responded by reaffirming the importance of testing – how else are we to choose between competing theories? – but have accepted the need to look afresh at ideas and beliefs, at the cognitive aspects of culture and to develop a methodology which can recognize the role of the individual and of agency in the inception of change.

A new cognitive-processual synthesis can thus be seen to have emerged in the 1990s, alongside the interpretive archaeologies which have succeeded the polemic of the early postprocessual archaeology.

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