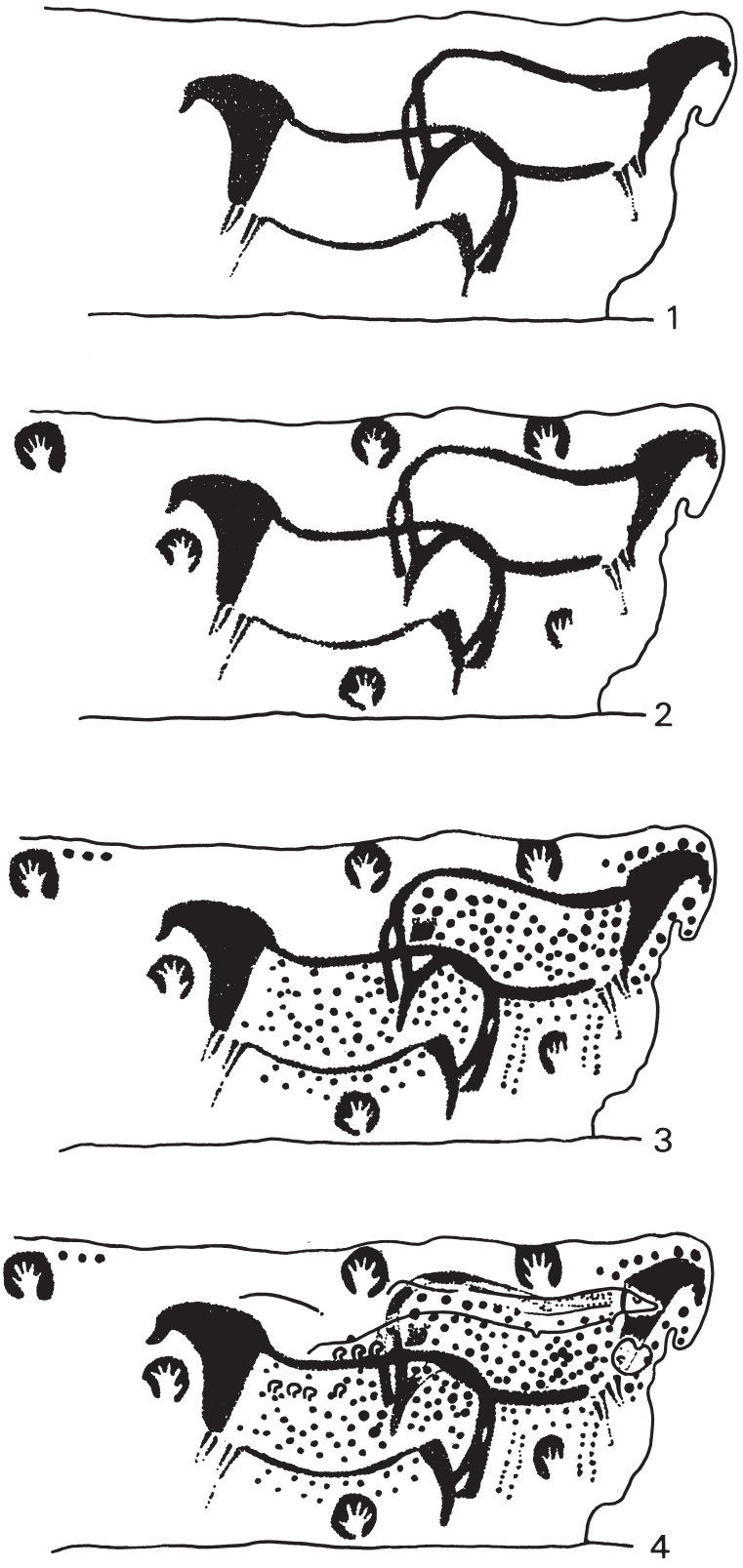
McDONALD INSTITUTE MONOGRAPHS

Cognition and Material Culture: the Archaeology of Symbolic Storage

Edited by Colin Renfrew and Chris Scarre



The four episodes of 'painting' activity that produced the 'spotted horses panel' in Pech-Merle. (Adapted from Lorblanchet 1995, 212–13.)

McDONALD INSTITUTE MONOGRAPHS

Cognition and Material Culture: the Archaeology of Symbolic Storage

Edited by Colin Renfrew and Chris Scarre

Published by:

McDonald Institute for Archaeological Research
University of Cambridge
Downing Street
Cambridge
CB2 3ER
(0)(1223) 339336

Distributed by Oxbow Books
United Kingdom: Oxbow Books, Park End Place, Oxford, OX1 1HN.
Tel: (0)(1865) 241249; Fax: (0)(1865) 794449
USA: The David Brown Book Company, P.O. Box 511, Oakville, CT 06779, USA.
Tel: 860-945-9329; FAX: 860-945-9468

ISBN: 0-9519420-6-9
ISSN: 1363-1349

Edited for the Institute by Chris Scarre (*Series Editor*) and Dora A. Kemp (*Assistant Series Editor*).

Film produced by Gary Reynolds Typesetting, 13 Sturton Street, Cambridge, CB1 2QG.
Printed and bound by Short Run Press, Bittern Rd, Sowton Industrial Estate, Exeter, EX2 7LW.

Cover illustration: *The so-called map of Bedolina, a prehistoric rock engraving from north Italy. (Copyright © 1998 by WARA, Centro Camuno di Studi Preistorici, 25044 Capo di Ponte, Italy.)*

This volume, and the conference from which it derives,
was inspired by *Origins of the Modern Mind*
by **Merlin Donald**, published in 1991.

Contents

CONTRIBUTORS

1. COLIN RENFREW
   McDonald Institute for Archaeological Research, Downing Street, Cambridge CB2 3ER.

2. CHRIS SCARRE
   McDonald Institute for Archaeological Research, Downing Street, Cambridge CB2 3ER.

3. MERLIN DONALD
   Department of Psychology, Queen's University, Kingston, Ontario, Canada K7L 3N6.

4. FRANCESCO D'ERRICO
   Chargé de Recherche au CNRS, UMR 5808 du CNRS, Institut de Préhistoire et de Géologie du Quaternaire, Av. des Facultés, 334015 Talence, France.

5. DAVID HALLE
   Sociology Department, University of California, Los Angeles, CA 90095-1551, USA.

6. PAUL L. HARRIS
   Department of Experimental Psychology, University of Oxford, Oxford OX1 3UD.

7. THOMAS A. DOWSON
   Department of Archaeology, University of Southampton, Southampton SO17 1BJ.

8. MARK LAKE
   Institute of Archaeology, University College London, 31–34 Gordon Square, London WC1H 0PY.

9. E.J. LOWE
   Department of Philosophy, University of Durham, 50 Old Elvet, Durham DH1 3HN.

10. STEVEN MITHEN
    Department of Archaeology, University of Reading, Whiteknights, P.O. Box 218, Reading RG6 6AA.

11. JESSICA RAWSON
    Merton College, Oxford OX1 4JD.

12. MARILYN STRATHERN
    Department of Social Anthropology, University of Cambridge, Cambridge CB2 3RF.

13. JULIAN THOMAS
    Department of Archaeology, University of Southampton, Southampton SO17 1BJ.

14. EZRA B.W. ZUBROW
    National Center for Geographic Information Analysis, SUNY at Buffalo, Buffalo, NY 14261-0023, USA.

15. PATRICK T. DALY
    Department of Anthropology, SUNY at Buffalo, Buffalo, NY 14261-0005, USA.

14. ROBERT A. HINDE
    St John's College, University of Cambridge, Cambridge CB2 1TP.

Figures

Tables

Preface

The papers in this volume represent the proceedings of a conference held at the McDonald Institute for Archaeological Research in Cambridge in September 1996 under the title 'The Archaeology of External Symbolic Storage: the Dialectic between Artefact and Cognition'. In bringing together a diverse group of speakers including not only archaeologists and anthropologists but also psychologists, a philosopher, a sociologist and an animal behaviourist, the aim was to generate interdisciplinary discussion about the nature of being human as revealed in the record of material culture.

The emphasis was on human cognitive expression and its development since the so-called Human Revolution at the beginning of the Upper Palaeolithic. The Human Revolution was the subject of an earlier McDonald Institute conference, the proceedings of which have been published in another volume in this series (Mellars & Gibson 1996). The cognitive aspects of the emergence of modern humans have received considerable attention, but much less consideration has been given to the changes which have taken place since the beginning of the Upper Palaeolithic. One of the few authors to have addressed the subject in a systematic way is Merlin Donald in his recent book *Origins of the Modern Mind* (1991), and one of Donald's key concepts is that of 'external symbolic storage': the development of devices outside the body (hence 'external') devised either explicitly or unconsciously to hold and convey information.

Perhaps the most obvious example of such symbolic storage is writing, but the conference sought to concentrate primarily on pre-literate and non-literate societies, and on the uses of non-literate symbols in literate societies. The symbols themselves vary widely in scope, type, and meaning. At one end of the scale are non-linguistic symbols which carry a clearly prescibed message, such as systems of weights and measures. At the other end are symbols of status and wealth, or symbols marking out the everyday world, the division of space and activity in domestic and non-domestic contexts. It is here that the concept offers such a powerful potential for archaeology, since it can be applied in a wide range of archaeological contexts, and to very different kinds of society. The concept can provide new insight into engraved artefacts of the Upper Palaeolithic, ritual bronze vessels from historical China, and twentieth-century art.

A key question throughout these proceedings was the impact which symbolic artefacts may have had in altering patterns of human behaviour. We could suggest that artefactual elements had a causative role in cognitive changes, perhaps even changes in cognitive capacities. For illustration, one could point to the phenomenal feats of memory achieved by non-literate societies, contrasting sharply with the limited memory abilities of individuals reliant upon writing and notation. This is not in itself to suggest there is any physical difference in the minds of the two groupings, though that cannot be ruled out. What it does illustrate is the dramatic impact which the development of material symbols may have upon the ways in which modern humans think. In reaching such a conclusion we must not of course overlook the importance of collectivities in moulding human consciousness — the social context of learning, of symbols, and of communication is crucial to the outcome. The value and meaning of symbols is fundamentally a question of social context; the value of the Varna gold is not so much a quality inherent in the material itself (even if the gold itself is rare and visually attractive) but is a quality socially ascribed. The same is true of weights and measures — these are essentially social conventions. We must also bear in mind that alongside the measurement values themselves, the instruments of weighing and measuring, and the associated nomenclature, may well have had symbolic connotations which went far beyond the simple determination of quantity.

Naturally enough in a conference of this kind, the concept of external symbolic storage was subjected to critical appraisal and review. Several participants expressed reservations about the idea, many of them emphasizing the reflexive quality of the relationship between humans and material culture, and the socially-situated nature of symbolic meaning. In using the term 'symbolic storage' we should make clear that what we have in mind is not a static concept, but one which refers to the interaction between humans and artefacts in a general sense. It is not simply a question of passive storage, of people creating symbols which convey a message to those who can read them; the symbols equally influence the viewer by their form and context, and the understanding of the symbol will itself be remoulded and changed over the course of time, as it gathers new

associations or connotations. The interrelationship is essentially a fluid one.

The papers in this volume survey the concept of symbolic storage across a wide framework of space and time, beginning with the so-called 'notations' of the Upper Palaeolithic, and the significance of Palaeolithic art, down to preferences in 'ethnic' art purchased by twentieth-century New Yorkers. One central session of the conference focused on the use of symbolic storage in the form of art or ritual to inform or reinforce belief. Another session considered the more subtle ways in which ordinary objects carry or facilitate the carriage of information, whether intentionally or subconsciously. A final section was devoted to the crucial role played by external symbolic storage in the transmission of knowledge from one generation to the next, and in particular the importance of mimesis, or learning by imitation.

The volume opens with introductory chapters by Colin Renfrew and Merlin Donald. The papers then follow in roughly the order in which they were given at the conference, plus an additional paper by Robert Hinde. Since the theme of the conference was inspired by Merlin Donald's work, and the term 'external symbolic storage' is taken directly from his *Origins of the Modern Mind*, it seemed appropriate to leave him with the final word, in a closing chapter in which he reviews the concept in the light of the conference discussion. The conclusion of the conference may given in his own words: that material culture can indeed create new cognitive opportunities, changing how members of a society think and represent reality, both individually and collectively.

References

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Mellars, P. & K. Gibson (eds.), 1996. *Modelling the Early Human Mind*. (McDonald Institute Monographs.) Cambridge: McDonald Institute for Archaeological Research.

Colin Renfrew & Chris Scarre
McDonald Institute for Archaeological Research
July 1998

Chapter 1

Mind and Matter: Cognitive Archaeology and External Symbolic Storage

Colin Renfrew

While Origins of the Human Mind *by Merlin Donald is recognized as the most coherent statement currently available on the development of human cognitive abilities, it is here criticized for laying insufficient emphasis upon the role of material culture in early human societies. In particular, a phase in cognitive development is proposed intermediate between that of linguistic or mythic culture, characteristic of* Homo sapiens, *and the subsequent development of theoretic culture, usually utilizing writing, in urban societies. The missing phase or stage is one employing symbolic material culture, and is characteristic of early agrarian societies with permanent settlements, monuments and valuables. It is of particular relevance for prehistoric societies after the Palaeolithic period.*

Merlin Donald's *Origins of the Human Mind* (1991) may be regarded as the most coherent statement which we yet have concerning the development of human cognitive abilities, set in the broader framework of human evolution, and taking adequate note of the information to be gained from the archaeological record. But Donald's work is only a beginning. And while it offers numerous penetrating insights, for instance into the role of writing, and in particular the role of alphabetic writing, it also (in my view) has some blind spots. In particular, as I shall try to show, it may be regarded as mentalistic. That is perhaps not a strong reproach in a work devoted to the mind. But there is implied here a dichotomy between mind and matter, which is in part misleading. I shall seek to show that much of the story of the development of human culture and cultures, and with them of 'mind' — for it is not altogether clear that the concept of 'mind' does more than refer to specific modes of behaviour (including thought) — is inseparable from human interaction with the material world. In particular much social life, perhaps most social life, is mediated by human interactions with things. We live in a world which we have made: it is a world of artefacts, to the extent that it is almost true to say that the world in which most of us live today *is* an artefact, albeit a complex one. Merlin Donald, who has other valid objectives, does not, I think, sufficiently deal with this material reality of things. Indeed to illustrate what is lacking, it is appropriate to set alongside *Origins of the Human Mind* another interesting and influential volume, edited by Arjun Appadurai (1986), *The Social Life of Things*. For here we see the importance of artefacts in the realm of human affairs: their role is symbolic as well as practical. Without them social life and indeed intellectual life could not have developed. So for me this conference was, amongst other things, an opportunity to rectify what I regard as an omission in Donald's perspective, as well as to celebrate the overall validity of his approach.

The focus of the present volume is deliberately *not* the question of the origins of *Homo sapiens sapiens* and our accompanying cognitive abilities: that has been the focus of a number of recent studies (notably Mellars & Gibson 1996; also Mithen 1996). Instead we are deliberately focusing upon the more neglected field of what happened in the field of cognition after the momentous events which led to the emergence of our own species.

I have myself a long-standing interest in these matters: my Inaugural Lecture (Renfrew 1982) was

entitled *Towards an Archaeology of Mind*, and set out to discuss some of the problems in this field. For as I have argued elsewhere (Renfrew 1989; Renfrew & Bahn 1991, 431–4) it is possible to discern a movement in recent archaeological thought towards what one may term cognitive-processual archaeology, which aspires to deal with some of these issues in as scientific and objective a manner as possible. This aspiration separates it somewhat from the 'post-processual' or interpretative approach to the world of symbols and meanings (e.g. Shanks & Hodder 1995), although in reality there is a fair degree of overlap between the two fields. Bell (1994, 305), writing as a philosopher of science, has contrasted the empathetic method of the 'post-processual' or interpretive approach with the methodological individualism or individualistic method which he sees as characteristic of cognitive archaeology. I see cognitive archaeology as one of the most interesting areas of archaeological research today (Renfrew *et al.* 1993; Renfrew & Zubrow 1994).

The missing phase: symbolic material culture

In *Origins of the Modern Mind*, Donald (see also this volume) sets out the following very broad sequence of cognitive phases, separated by three major transitions:

Episodic culture, characteristic of primate cognition

(first transition)

Mimetic culture, characteristic of *Homo erectus*

(second transition)

Linguistic or mythic culture, characteristic of early *Homo sapiens*

(third transition)

Theoretic culture utilizing External Symbolic Storage

Donald (1991, 275) notes that mythic culture extended to include all upper Palaeolithic, Mesolithic and Neolithic societies. While noting the origins of visuographic invention in the pictorial representation of the Upper Palaeolithic cave paintings his attention then shifts (Donald 1991, 285) directly to early writing systems in Mesopotamia, and the only systems of External Symbolic Storage to which he gives careful consideration are writing systems. Although Stonehenge is considered in the treatment of early analogue models (Donald 1991, 338), sapient life and thought prior to the emergence of literacy is only sketchily dealt with:

> The complex technological and social developments that preceded writing might suggest the existence of some apparently analytic thought skills that contained germinal elements leading to later theoretic development. However early inventions were pragmatic and generally not far removed from nature: for example, the domestication of animals and plants would not have required more than a recognition, transmitted over time, that certain species were desirable and domesticable for human use. Complex constructional products, such as brick structures and sailing vessels, might be seen as grand elaborations on the ancient toolmaking skills of humans. The social organisation of the first towns and cities presumably borrowed heavily from existing family and tribal structures. These pragmatic developments, impressive as they were, lacked the essentially reflective and representational nature of theory. (Donald 1991, 334–5)

Donald shows illuminatingly how it was the first fully effective phonetic system of writing utilized by the Greeks which allowed them to develop to the full their theoretic attitude by externalizing the process of oral commentary: 'They founded the process of externally encoded cognitive exchange and discovery' (Donald 1991, 343).

For Donald, therefore, theoretic thought is to be associated with literacy, and hence with urban civilization and state society. In its fully-developed demythologized and secularized form it is first seen with the Greeks in the seventh century BC.

But what of the long development of culture and society in different parts of the world between the hunter-gatherers of the Upper Palaeolithic on the one hand and the first urban citizens of Sumer or of Mexico? The processes of development were slow and gradual, but many of the changes were profound. Clearly many scholars today would not agree with Donald's view of the rather rudimentary nature of the changes involved in the origins of farming. Cauvin (1987) for instance, has stressed the symbolic dimensions of the inception of farming in Southwest Asia, and Hodder (1990) has explored cognitive aspects of early farming in Europe.

My central point, however, is that without artefacts, material goods, many forms of thought simply could not have developed. That is clearly true in the field of religious belief, where the distinctions made between deities, for instance, are in part dependent upon the possibility of representing them. But it is

true much more widely than this. One of the lessons in prehistoric archaeology over the past two decades has been the *active role of material culture*. For material culture is not only reflective of social relations and of cognitive categories: it is to a large extent constitutive of these also (Hodder 1986).

This is clearly so in a purely descriptive sense: the concepts of house (with roof, walls, floor, windows) and furniture (chairs, tables, carpets, lights, cutlery) must clearly be consequent upon the prior existence of such artefacts. But it is true also in an *ascriptive* sense, where values or qualities are ascribed. For just as the term 'hot' cannot have meaning without there being objects which may be so described, so we cannot conceive of valuables without there being objects or commodities to which value is ascribed.

John Searle in his *The Construction of Social Reality* (1995, 119) has stressed that what he terms 'institutional facts' (facts which can exist only within human institutions) only exist by human agreement, and that in many cases they require official representations, or in his terminology 'status indicators' because 'the existence of institutional facts cannot in general be read off from the brute physical facts of the situation'. Perhaps because he is a philosopher, he thinks in terms of words, whether spoken or written, as the usual form for such indicators. But in reality many indicators take the form of visual symbols, that is to say artefacts. And some of the most important institutional facts are embodied in artefacts and could not exist without them.

As Searle (1995, 37) puts it: 'Only beings that have a language or some more or less language-like system of representation can create most, perhaps all institutional facts, because *the linguistic element appears to be partly constitutive of the fact*.' While this is indeed valid, we can go on to remark that in some cases the material element, and specifically the artefact, is also constitutive of the fact.

Two examples will illustrate this integral relationship between concept, linguistic term and artefact.

The first is the whole field of measurement, which we may discuss with weight, by way of example. The term 'weight' is meaningless unless one has objects possessed of mass, and the notion of standardization arises naturally if one has a number of identical objects. In order to measure weight it is necessary to have some balancing device and a reference object which can serve as the unit of measure. In all of this it is clear that the possibility of weighing has to arise from experience with the artefacts of the real world (Renfrew 1982).

The second example relates to value. The notion of a valuable substance or commodity must surely be secondary to the prior existence of objects or materials which are attractive or significant, so that 'value' can indeed be ascribed to them by consensus. Value may, of course, be ascribed rather arbitrarily to materials, but without the special materials the concept itself would have little meaning (Renfrew 1986).

There was a long period in the long-term development of most societies when such concepts as these could develop. In general, the rather sophisticated activities for which writing was presumably devised do themselves depend upon the existence of a series of concepts such as these: they are indeed cognitive concepts. But in many cases they are not *only* mental or cognitive constructs: they are based upon interaction with the real world, and in general upon interaction with symbolic artefacts which operate within the prevailing social world. They are indeed dependent upon language, for it is through language that their ascribed meanings are agreed, made known and passed on. But these symbols have physical existence, and without this existence they could have no meaning, indeed there would be no meaning.

This leads me to suggest that there is in Donald's evolutionary sequence a missing phase, where the role of artefacts as symbols is increasingly significant. It arises from the Mythic or Linguistic Culture of early *Homo sapiens*, and is absorbed into and forms the foundation for the Theoretic Culture of the literate citizen. It is the phase of symbolic artefacts or material symbols, of Symbolic Material Culture.

The phase of symbolic material culture

It is worth going so far as to make this suggestion more concrete by modifying Donald's basic sequence in order to include it. The sequence of transitions has now four rather than three major episodes of change. The first two transitions are still genetically based: the shift from early hominids to *Homo erectus*, and the shift from *erectus* to *sapiens*. But Donald telescopes events in squeezing subsequent history into a single transition. To do so ultimately risks favouring unduly the development of writing systems, undoubtedly one of the crucial mechanisms of External Symbolic Storage, but hardly the earliest. External Symbolic Storage is one role, it has been suggested, of Palaeolithic cave art, used in effect as a teaching aid (Pfeiffer 1982). Marshack (1972) makes a claim for what is in effect the storage of chronological information in what he sees as the time-structured

engravings on bone of the Franco-Cantabrian Upper Palaeolithic. But it is not until the inception of farming that we see the widespread development of permanent village settlements, and often the rise of consistent burial practices for the disposal of the dead. The household and its contents — as well as the tomb — offer a new range of opportunities for material culture to operate symbolically.

Revised system of cognitive phases

Episodic culture, characteristic of primate cognition

(first transition)

Mimetic culture, characteristic of *Homo erectus*

(second transition)

Linguistic or mythic culture, characteristic of early *Homo sapiens*

(third transition)

External Symbolic Storage employing symbolic material culture, characteristic of early agrarian societies with permanent settlements, monuments and valuables

(fourth transition)

Theoretic culture using sophisticated information retrieval systems for External Symbolic Storage, usually in the form of writing, frequently in urban societies.

These phases are not of course simply sequential. We still learn to ride a bicycle, or drive a car, or type as much by mimesis, and by frequent repetition establishing motor sequences, as we do by reason or theory or other language-assisted modes of instruction. Our own culture remains to a large extent 'linguistic, or mythic'. Even so it may be a valid approximation to suggest that the third transition here may often be equated with the transition to food production, and thus the so-called 'Neolithic revolution' of the Old World. It is at this time that so many symbolic categories of artefact are created and come into their own, which are not preserved among Upper Palaeolithic hunter-gatherers. To say this is not necessarily to imply that they are not in use among hunter-gatherer societies today. It is too often assumed that modern hunter-gatherers may simply be taken as surrogate representatives of our hunter-gatherer ancestors.

The fourth transition, to theoretic culture, is generally associated with the development of writing, and reached some sort of a climax with the development of the alphabet and its use by the classical Greeks. In a general sense it is pertinent to ask whether this is in general correlated with the development of urbanism. It does not follow from such a generalization that one cannot have theoretic culture without cities, nor that theoretic culture is a feature of all urban societies. But it may not be inappropriate to suggest some relationship or correlation between what is here describes as the fourth transition and what Gordon Childe (1936) described as the 'urban revolution'.

The past/present paradox

As an aside, it is worth pointing out that there is something decidedly unsettling about Donald's evolutionary sequence, which at first sight one imagines as a temporal sequence. But what of modern or recent non-literate societies? Are they not members, like our literate selves, of the most recent phase of Theoretic Culture? Are modern hunter-gatherers still in a phase of Mythic Culture, and traditional non-urban farming societies in one of Symbolic Material Culture? As noted above, Donald (1991, 275) applies the term mythic culture to all upper Palaeolithic, Mesolithic and Neolithic societies: but it is not clear how he could apply a temporal restriction in order to avoid applying the term to all hunter-gatherer societies or to all isolated, egalitarian farming societies, including those of the modern or recent world, in what we sometimes conveniently think of as the ethnographic present. This would imply that the distinctions in question are not in reality chronological ones, but are dependent upon matters of cultural context. Does this of necessity imply a re-awakening of interest in '*la pensée sauvage*'? It is self-evident that one seeks to avoid a return to gross generalizations about 'primitive thought' which were so current a century ago, but unless clear and more subtle distinctions are drawn there is an evident risk.

As noted above, however, it is modern archaeologists and ethnographers who perhaps too readily equate modern hunter-gather societies with those of our Upper Palaeolithic predecessors. Modern hunter-gatherer societies are the product of forty centuries of sapient evolution, just as much as urban ones. They should not be regarded as living representatives of the Palaeolithic past.

The same question can be posed at a more individual level. What of the non-literate individual within a modern urban culture, where the majority of citizens are literate? Is this person in some Mythic Phase, lacking the practice of theoretic thought? To pose the question invites the response that more 'primitive' modes of thought are still with us. Perhaps that is the right answer, and Donald in his book does indeed explore the consequences of different kinds of educational experiences, in particular in the Middle Ages. But there are some complex issues to disentangle here.

This brings us close to the 'sapient paradox' (Renfrew 1996), whereby we realize that, if biologically modern humankind made its appearance in Europe nearly 40,000 years ago, possessing the same innate genetic abilities as ourselves, then it is the intervening centuries of learned behaviour, and only that, which separates them from us.

Symbolic material culture as external symbolic storage: the example of prehistoric Britain

The British case is a good one to choose for the present purpose, precisely because we may rely upon what one might term the 'new British prehistory' for quite a rich discussion. What is needed, of course, is a separate and close examination of a number of independent trajectories of change: Southwest Asia, perhaps, and Mesoamerica, and China. In each case one would wish to see what may be said about the origins of the modern mind in relation to the archaeological record there. To what extent may one describe the culture of Ming China as 'theoretic' in Donald's sense? Or that of the Aztecs of Mexico and the Incas of Peru? No doubt few world civilizations would reach the degree of theoretic cerebration displayed by the Greeks. But would not the Chinese or the Maya rank with the Sumerians? These are questions which have to be asked, and some of the answers are no doubt already there for the attentive reader of *The Cloud People* (Flannery & Marcus 1983) or *Science and Civilization in China* (Needham 1954)

The discussion surrounding the Neolithic and Bronze Age periods of British prehistory has been particularly rich in recent years, with scholars such as Richard Bradley, Julian Thomas, Nick Thorpe, John Barrett, Colin Richards and David Clarke examining closely the various interpretations which have been offered, while the same may be said of J.D. Hill and other authors for the British Iron Age. These authors, using a variety of approaches, have wrestled with the meanings which may be ascribed to the major monuments which characterize the Neolithic period of Britain.

It should be borne in mind, in the present context, that monuments are built for remembrance. They are often memorials. It is the role of a memorial to serve the memory, often the collective memory. Even in the modern literate age, most memorials do this most effectively without relying very heavily upon the written word. Sometimes indeed they are the means by which memories are preserved which would otherwise be lost. All of this is very relevant to our central theme of 'external symbolic storage'.

It is true of course that a prehistoric monument cannot now tell its story, with chapter and verse of the original myth or narrative or history, quite as effectively as can an Egyptian or Assyrian or Hittite monumental inscription where the deeds of the 'Great King' are set out in cuneiform or in hieroglyphs. But it is probably true to say that even at the time these historic monuments were erected there would have been few who could read the baleful signs inscribed upon them (and almost certainly not the great kings themselves). And of course their explicit detailed message was completely lost along with the understanding of the scripts which were used until the great decipherments of the past two centuries. So it would be a mistake to exaggerate the significance of the written component of the 'external symbolic storage'. The story which went with these monuments would have been well known to their contemporaries, just as the significance of Silbury Hill or the Dorset Cursus in Wessex was in their day. And even if the details were not recalled, the general import (i.e. celebration of the mighty victories of the great king) would have been obvious to all living within the culture in question.

But the language of the symbolic artefacts changes. With the passing of the Late Neolithic, fewer monuments were constructed. Special artefacts, often of the new synthetic material bronze, came into prominence. Many of these are familiar from burials, especially from the early Bronze Age. But later, many objects of value were deliberately offered up, sometimes in bogs or rivers. This practice, which at first sight today is difficult to understand, has been analyzed by Richard Bradley (1990) in *The Passage of Arms*, and again we see that artefacts were being used to fulfil a very special function which could not have been achieved without them.

In Britain it is clear that there was a gradual development of what Searle would term 'institutional facts' in the societies of the day, alongside what may have been the 'brute facts' of material

existence. But while some might be inclined to relegate subsistence mode, for instance, and settlement pattern to the realm of 'brute facts' (i.e. those which exist quite independently of language or any other institution), it is now clear that the transition from hunter-gathering to farming in northwestern Europe was not an automatic one, brought about at once when the relevant domesticates became available. Subsistence mode was in large measure a matter of choice (Zvelebil 1986) and strongly conditioned by the nature of society and the social organization. In human affairs, brute facts rarely have absolute primacy over institutional facts. What is believed and what is agreed, that is to say the perceived reality, is as powerful as what one might today judge to be the real, physical reality.

British prehistory, most would now agree, is as much the story of developing concepts and beliefs as it is of developing technologies and subsistence practices and of demography. These concepts and beliefs were mediated by and often embodied in the structures and artefacts of the day — that is what is meant by the active role of material culture. These artefacts are part of the story. It cannot be understood without symbolic material culture. It may be, however, that in the broader context of study which Donald has set up that we shall come to understand that symbolic material culture rather better.

Colin Renfrew
McDonald Institute for Archaeological Research
Downing Street
Cambridge
CB2 3ER

References

Appadurai, A. (ed.), 1986. *The Social Life of Things*. Cambridge: Cambridge University Press.

Bell, J.A., 1994. *Reconstructing Prehistory: Scientific Method in Archaeology*. Philadelphia (PA): Temple University Press.

Bradley, R., 1990. *The Passage of Arms*. Cambridge: Cambridge University Press.

Cauvin, J., 1987. L'apparition des premieres divinites. *La Recherche* 194, 1472–80.

Childe, V.G., 1936. *Man Makes Himself*. London: Watts.

Donald, M., 1991. *Origins of the Human Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Flannery K.V. & J. Marcus (eds.), 1983. *The Cloud People: Divergent Evolution of the Zapotec and Mixtec Civilizations*. New York (NY): Academic Press.

Frankfort H., H.A. Frankfort, J.A. Wilson & T. Jacobsen, 1949. *Before Philosophy: the Intellectual Adventure of Ancient Man*. Harmondsworth: Penguin Books.

Hodder, I., 1986. *Reading the Past*. Cambridge: Cambridge University Press.

Hodder, I., 1990. *The Domestication of Europe*. Oxford: Blackwell.

Marshack, A., 1972. *The Roots of Civilisation: the Cognitive Beginnings of Man's First Art, Symbol and Notation*. New York (NY): McGraw-Hill.

Mellars, P.A. & K. Gibson (eds.), 1996. *Modelling the Early Human Mind*. (McDonald Institute Monographs.) Cambridge: McDonald Institute for Archaeological Research.

Mithen, S., 1996. *The Prehistory of the Mind*. London: Thames & Hudson.

Needham, J., 1954. *Science and Civilisation in China*, vol. 1. Cambridge: Cambridge University Press.

Pfeiffer, J., 1982. *The Creative Explosion: an Inquiry into the Origins of Art and Religion*. New York (NY): Harper & Row.

Renfrew, C., 1982. *Towards an Archaeology of Mind*. (Inaugural Lecture.) Cambridge: Cambridge University Press.

Renfrew, C., 1986. Varna and the emergence of wealth in prehistoric Europe, in Appadurai (ed.), 141–68.

Renfrew, C., 1987. Problems in the modelling of socio-cultural systems. *European Journal of Operational Research* 30, 179–92.

Renfrew, C., 1989. Comments on 'Archaeology into the 1990s'. *Norwegian Archaeological Review* 22, 33–41.

Renfrew, C., 1996. The sapient behaviour paradox: how to test for potential?, in Mellars & Gibson (eds.), 11–14.

Renfrew, C. & P. Bahn, 1991. *Archaeology: Theories, Methods and Practice*. 2nd edition. London: Thames & Hudson.

Renfrew, C. & E.B.W. Zubrow (eds.), 1994. *The Ancient Mind: Elements of Cognitive Archaeology*. Cambridge: Cambridge University Press.

Renfrew, C., C.S. Peebles, I. Hodder, B. Bender, K.V. Flannery & J. Marcus, 1993. Viewpoint: What is cognitive archaeology? *Cambridge Archaeological Journal* 3(2), 247–70.

Searle, J.R., 1995. *The Construction of Social Reality*. Harmondsworth: Allen Lane.

Shanks, M. & I. Hodder, 1995. Processual, postprocessual and interpretive archaeologies, in *Interpreting Archaeology: Finding Meaning in the Past*, eds. I. Hodder, M. Shanks, A. Alexandri, V. Buchli, J. Carman, J. Last & G. Lucas. London: Routledge, 3–29.

Zvelebil, M. (ed.), 1986. *Hunters in Transition: Mesolithic Societies of Temperate Eurasia and Their Transition to Farming*. Cambridge: Cambridge University Press.

Chapter 2

Hominid Enculturation and Cognitive Evolution

Merlin Donald

Hominid cultural stages may be classified by applying strict cognitive criteria to existing chronological data. When several of these factors converge during a given time period, we have reason to propose a major cognitive-cultural 'transition' during that period. There are four proposed stages: 'episodic', 'mimetic', 'mythic' and 'theoretic'. Each hominid transition introduced a new level of cognitive governance, and consolidated a permanent, semi-autonomous layer of hominid culture. Previous cognitive structures were always retained at each transition, and it is this which has yielded the rich, multi-layered cognitive-cultural structure of the modern mind.

Human culture has become a major player in shaping cognition through its enormous epigenetic influence, which gives it the power to exploit latent cognitive potential. Hominids have capitalized upon this evolutionary opportunity to an extraordinary degree with the invention of external symbolic technologies, which, along with all of material culture, now have a determining influence on human cognition.

What is a truly 'modern' mind? One might argue that humans haven't changed very much since the Old Stone Age. The cultural remnants of the Magdalenian period, or even the Aurignacian, feel fully modern in the sense that there is a cleverness there, a tendency toward innovation and symbolism, that we instantly recognize as similar to our own. Strip away our accumulated technology and institutional structure, and there but for the grace of historical accident, as we might say, go ourselves. A corollary of this belief is that within the past 40,000 years there has not been any significant evolution of human cognition. The strongest form of this idea is that our modern cultural explosion has been driven by a mind that hasn't changed significantly since our speciation. Perhaps the most compelling evidence of this is the fact that many individuals have moved from the New Stone Age to post-industrial society in a single generation.

However, although the latter demonstration is fairly easy to make, it can lead to simplistic conclusions about the so-called constancy of human cognition, because it overlooks the potentially radical cognitive effects of enculturation. There is a close relationship between cognitive skill, especially what might be called latent individual capacity, and the process of enculturation. Individuals do not leap into modernity on their own, but rather must make the transition through a process of intense cultural embedding. That embedding process, especially if it occurs in early childhood and is sufficiently all-encompassing, might lead to the successful enculturation of the individual into a society very different from the one into which that person was born. But this process involves much more than 'programming' an individual brain with arbitrary cultural content. Members of a given culture become part of a collectivity, defined not only by specific languages and writing systems, but also by specialized representational strategies and thought skills. This constitutes the core of what is commonly known as 'higher' cognition. The power of enculturation to release latent capacity in this realm is sometimes astonishing.

The radical effects of enculturation are perhaps best demonstrated in primates because the results

are so clear and unconfounded by subjective human cultural biases. Consider the chimpanzees: in the wild these animals do not show any linguistic capacity, and have very limited use of tools. When first raised in human households they were not able to acquire gestural capacity or other essential human cognitive skills such as the sharing of attention. Yet raised in an artificial culture designed by Savage-Rumbaugh and her colleagues (1993), pygmy chimpanzees have shown capacities that were formerly thought to be completely out of the reach of their species. They can learn to make Oldowan stone tools, and to modify them and use them purposefully. They can understand sentences of naturally-spoken English, including reversible sentences in which some grammatical competence is necessary to grasp the meaning. They can acquire a large lexicon of visual symbols — several hundred in some cases — and use them appropriately. They can also use visual symbols to communicate with other symbolically-competent chimpanzees to coordinate their collective activity in solving various problems and challenges; in this they are more effective at social coordination than their wild-reared conspecifics.

In sum, after undergoing this radical process of enculturation pygmy chimpanzees do not act, think, or communicate like the same species. They do things they could never achieve in the wild, obviously without changes to their genome. This raises an interesting possibility: humans may also have fundamental characteristics of mind that would not be evident outside a very specific cultural context. Savage-Rumbaugh's chimps may be regarded as 'overachievers' in the sense that they did not create the culture that revealed their latent capacities. But then again, neither did most humans create the cultural environments that mould their cognitive destinies. Perhaps most individual human beings are also cognitive overachievers carried along by various cleverly contrived cultural environments (we will worry about who did the contriving later). Historically, certain strategic kinds of cultural innovation might have released significant, and previously unseen, cognitive capacities.

This is not to minimize the role of genetic change in hominid cognitive evolution; for radical enculturation to work, the potential to copy strategic elements of the target culture must be there, in the genes. Once again, the primate example is perhaps clearest: pygmy chimpanzees have the capacity to absorb certain elements of human culture, but they evidently have serious limitations as a species that prevent them from being able to copy all the critical components of human culture, let alone invent them. The species has a zone of potential for cognitive growth, but it has to remain within that limited zone. Early hominids descended from an ancestor that closely resembled the pygmy chimpanzee, and presumably shared most of its intellectual limitations, but they must have undergone major genetic change before they acquired the capacity not only to copy, but also to invent essential elements of modern human culture. Both enculturation and genetic change can be said to have shared a continuum of influence on the evolution of hominid cognition, the two factors interacting in evolution. Seen in this way, human cognitive evolution has never really stopped; but its centre of gravity has shifted gradually from the genome to a cumulative process of enculturation.

The precise time course of hominid cognitive evolution may never be known, but the period during which the evolutionary momentum appears to have switched most strongly toward culturally-driven cognitive change seems to be the Upper Palaeolithic. It may be difficult to establish whether the explosion of cave paintings, amulets, sculptures, engravings and notational artefacts that marked the Upper Palaeolithic was sustained throughout the entire period, or periodically disappeared and reappeared, but there is little doubt that, over the long run, the process of representational invention accelerated in that era. As the process became somewhat more secure, and as human population density increased, it accelerated at an ever faster rate. There are, however, many unanswered cognitive questions about this critical time: How was spoken language evolving? Was its evolution closely tied to other forms of symbolic invention? What were people thinking about, and what types of thought-processes dominated? Were their prevalent belief systems essentially similar to those of New Stone Age peoples, or were they different in important ways? Human knowledge during this period was presumably accumulating, but how fast, and in what areas? Did the transition from hunting and gathering to agriculture, and from the latter to urban society, impose sufficiently traumatic selection pressures that further biological evolution continued to play a major role on the cognitive level, as we know it did in the case of the immune and digestive systems? Or did the interaction between enculturation and cognition eventually become independent of biological evolution?

The great value of archaeological reconstruction to cognitive science is that it forces us to ask these questions. Any theory of human cognitive structure

and function has evolutionary implications, whether or not they are made explicit. It is important to make such assumptions explicit; testing various scenarios conceptually might help us choose between various theoretically possible orders and hierarchies of emergence, and thus throw light on modern neuropsychological structure. Conversely, we might actually come up with better hypotheses about cognitive evolution itself. But this won't happen unless theories of origin try to reconstruct underlying cognitive change as well as what was happening on the cultural surface.

Modularity and the notion of emergent cognitive architecture

Archaeological researchers have developed various theories of cognitive evolution to help interpret their reconstructions of the hominid past. Their efforts are enormously stimulating to read, yet this kind of cognitive theorizing has often stood in splendid isolation from modern cognitive research, and when it has tried to become connected to the cognitive mainstream, it has tended to prefer very old ideas. To take a few examples, in no particular order, there are Wynn's (1989) use of Piagetian notions about operational intelligence and formal geometry to interpret the cognitive implications of stone tools; Davidson & Noble's (1989) rather unique proposals, based loosely on the theories of Vygotsky and Ryle, about the linkage between depiction and language; and White's (1989a,b) theories on the cultural meaning of the earliest human body ornamentation, and the implied cognitive shift that took place as human culture moved beyond bare subsistence. The theoretical synthesis recently proposed by Gamble (1994) also contains a number of ideas that bear directly on the origin and special nature of human cognition, but these are not drawn from modern cognitive science or evolutionary psychology.

In fairness, this may be due to a difference in focus. Archaeology is time-oriented, and precise chronology is important, indeed central to the discipline. But evolutionary psychology has traditionally been less concerned with precise chronology than with emergent structure. Mind, despite its apparent formlessness, has structure, just the way an organism or a corporation has structure. One term commonly used to describe this structural arrangement is 'modularity'; the mind appears to be composed of many semi-autonomous modules or organs, each performing its own special function. Brain modules can be damaged independently of one another: for instance, a patient may lose the power of speech, while retaining visual recognition, or *vice versa*. This implies that the brain modules performing visual functions are autonomous from those performing speech. There are a large number of similar dissociations in the clinical literature.

Mental modules seem to have emerged in a certain evolutionary order, and have a direct link to the emergence of specialized brain structures. This idea was foreseen in MacLean's (1973) evolutionary model of the human brain, which postulated Reptilian, Palaeomammalian, and Neomammalian components. The Reptilian brain was conceived of as a cluster of component modules in the upper brainstem, midbrain and basal ganglia. These regions are concerned mostly with basic drives, reflexes, and reactions that first appeared far back in evolutionary time, with the emergence of reptiles. The blueprint of the Reptilian brain has survived in all higher vertebrates, and its survival in humans is a vestige of our descent from reptiles. MacLean's second cluster, the Palaeomammalian brain, includes those areas of the limbic system and cortex that support the most ancient mammalian instincts and emotional reactions; the blueprint of these complex structures also survives in the human brain. His third cluster, the Neomammalian brain, was superimposed on the pre-existing Reptilian and Palaeomammalian acquisitions, and consisted mostly of the neocortex, which became especially large in humans. Maclean made no effort to specify the subcomponents of our specifically 'human' intelligence, or the stages that led to its evolution. Some recent theories, however, have tried to specify how the uniquely human features of brain and cognition evolved from the Miocene apes (Bickerton 1990; Bradshaw & Rogers 1993; Calvin 1993; Corballis 1991; Donald 1991; Dennett 1991; Gibson & Ingold 1993; Greenfield 1991; Lieberman 1991; Pinker & Bloom 1990; Pinker 1994).

Although many mental functions may be modular, consciousness itself does not appear to be modular, and appears to involve integration across many subsystems. For this reason, perhaps, the place of consciousness in any evolutionary scenario is special. Most of the basic operations of the mind and brain operate outside of consciousness. In fact, the defining characteristics of cognitive modules — specialized design, isolation from irrelevant information, mandatory operation — are the opposite of those that mark conscious thought, which tends to be general-purpose, open to many kinds of information, and voluntary in operation. In contrast, the operations of brain modules are usually inaccessible

to conscious introspection (Fodor 1983). A good example of their isolation from consciousness may be illustrated with the example of human speech: speakers blithely produce sentences at output rates that are near the physiological limits of the system without any awareness of where the words or sentences are coming from. In a sense, speakers find out what they have said when everyone else does; just prior to speaking a word or sentence in a normal conversational context, there is no awareness of precisely what is about to be said. This principle of inaccessibility applies equally to a variety of other mental operations. Given the existence of many isolated and essentially unconscious subsystems the unity of consciousness poses a major theoretical puzzle, and it is not known how the products of dozens of semi-autonomous modules are integrated into one seamless stream of consciousness.

One popular theory is that consciousness occurs somewhere else, outside the modular hierarchy. That hypothetical place in the mind, the locus of consciousness, has been called the 'central processor', where modular outputs supposedly come together in awareness. In this common conceptualization of the mind, the central processor can range freely over the specialized outputs delivered by modules — sounds, objects, sights, feelings, places, words — comparing and unifying these various elements into a single stream of personal experience. Thus the central processor is at the apogee of mental operations, and the more rigidly-constrained 'modules' of the mind seem to be arranged in complex nested hierarchies that feed their outputs into the central processor. An analogy might be made to the role of the CEO's office in a corporation: it receives inputs from all sorts of lower-level organizational structures. Like the CEO's office, the putative central processor must know as much as possible, and be relatively unbounded; that is, remain open to a wide variety of influences, rather than being narrowly dedicated to a specific task. Its primary function is related to what some call 'large-scale neural integration' or the synthesis of knowledge across many different neural subsystems. This principle applies to many different mammalian species, since all mammals share basically similar nervous systems. However, this specific modular arrangement — the architecture of mind — appears to be quite unique in the human species.

In this theoretical context, hominid cognitive evolution might have involved a gradual expansion of the powers of the primate central processor, or the evolution of new specialized modules, or both. The idea that humans might have simply expanded their powers of large-scale integration and thus increased the capacity of their central processor has some support from both gross neuroanatomy and artificial intelligence research. First, there is important negative evidence from neuroanatomy: the most obvious distinction of hominid brains is their relative size, rather than their anatomical structure; the rapid increase in hominid encephalization produced no dramatically new structures in the human nervous system, and Passingham (1982) has stated that the modern human brain has exactly the proportions and structure that might be predicted of a very large primate brain by extrapolating earlier primate expansions. Second, computers can be made to perform qualitatively new cognitive operations with a merely quantitative increase in capacity; thus a larger brain might be expected to acquire novel operational capacities as it crossed a threshold of critical mass. Finally, archaeological evidence of cultural progress generally follows evidence of brain expansion with a considerable delay, rather than appearing at exactly the same time. For example, Acheulian tools appeared several hundred thousand years after the expansion of the hominid brain in early *Homo erectus*. This suggests that there was a general-purpose brain expansion early in the history of this species, driven by something other than tool-making, that produced delayed effects on tool-making through gradual enculturation, rather than through the action of a specialized hominid brain adaptation for improved tool-making. Hence even major new capacities, like speech, might have emerged from a quantitative expansion of existing primate integrative capacities, allowing for a sufficiently long delay to allow a degree of cultural experimentation. Savage-Rumbaugh and her colleagues (1993), who have had such success in demonstrating the symbol-using capacities of enculturated pygmy chimpanzees, have recently expressed some support for this possibility.

The contrary view is also credible: cognitive evolution must have occurred at least partly at the modular level. Human cognition has some unique features that seem to demand such an explanation. The prime example is language; as Chomsky (1993) pointed out, human language has special features that require a specialized brain module, and some recent evolutionary proposals have reflected that view (Bickerton 1990; Pinker 1994). In these proposals language must reside in a set of novel, uniquely human brain capacities that are specialized for generating language. Although this idea is still controversial, at least one aspect of language is bound to have a modular explanation: human vocal skill

constitutes a dramatic break with our primate heritage and seems to depend on several neural modules that are specific to speech capacity (Lieberman 1984; 1991). Some other aspects of human higher function appear to demand specialized adaptations: left-hemisphere thinking skills, including aspects of sequential motor control, have properties that seem to involve new computational principles (Corballis 1991; Greenfield 1991) and thus imply new evolutionary modules.

On the other hand, such an approach leaves the evolutionary theorist with a dilemma; how do we establish continuity in what appears to be a discontinuous adaptation? There have been various attempts to solve this problem, by scaffolding language on top of various other, more fundamental alterations in the apparatus of mind. But the question of conscious integration remains unsolved, along with the even more perplexing question of the nature of the underlying semantic system that supports, drives, and ultimately invents languages. The machinery of language evidently gains free access to a variety of other cognitive subsystems; and this feature suggests that, to some degree, language is also non-modular in design. This implies that eventually the problem of human cognitive evolution must be addressed at the level of central processing capacities, whether or not the solution takes a traditional or a radically different form.

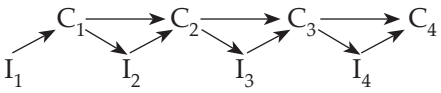
In the first section of this paper I proposed the idea that both enculturation and genetic change contributed to the cognitive capacities that are manifest in modern humans. In the second section I introduced the notion of modularity and neuropsychological structure. By combining these ideas it becomes clear that the structural changes that characterize hominid cognitive evolution must have been intricately involved with hominid culture throughout the evolutionary process.

A conceptual basis for the cognitive classification of hominid culture

Cognition and culture are in many ways mirror-images, especially in the human case. Cognition is traditionally identified at the level of single individuals — this might be termed the assumption of the 'isolated mind' — and in other species this assumption seems largely justified, since non-human species do not have a capacity for intentional representation, and are thus unable to transmit acquired knowledge across generations. (They may transmit patterns of conditioning, but this is merely a function of environmental reinforcement, not of intentional representations.) Knowledge acquired during the lifetimes of individuals remains locked inside each brain, tied to the experience of one individual, and there is no way that this knowledge can become public, or serve as the basis for gradually building a shared representational culture.

In humans there is a collective component to cognition that cannot be contained entirely within the individual brain. It is the accumulated product of individually-acquired knowledge that has initially been expressed in a form comprehensible to other members of a society, tested in the public domain, filtered, and transmitted across generations. The gradual process of embedding separate minds in an evolving culture, so that individuals increasingly fall under the sway of that culture, might be called 'emergent enculturation'. This process is the reverse face of the evolution of representational skill at the species level. The byproduct of such a development is the public representational domain; that is, a realm of expression where knowledge and custom can be created through the interaction of individual minds, and thenceforth shared by all members of the culture. The story of human cognitive evolution revolves around this radical shift from the 'isolated minds' of other mammals, towards the 'collective' mind that typifies humans living in symbol-using cultures. Collectivity depends ultimately on individual capacity; but this is a reciprocal relationship; enculturation has become more and more important in setting the parameters of human capacity at the individual level. Galloping hominid enculturation undoubtedly interacted with brain evolution; it is self-evident that the ability of individuals to cope with a rapidly-evolving representational culture would have had immediate, and at times drastic, fitness implications. Thus the hominid brain and cognition evolved in symbiosis with an emerging process of enculturation.

This symbiosis, specific to humans, might be envisaged as a series of changes progressing in parallel at two levels: individual and cultural:



(C = Successive cultural environments)
(I = Individual representations)

The culture establishes the environment within which ontogenesis will take place; and the developing

individual also contributes to the cultural environment. The representational environment changes to a degree during a person's lifetime and dramatically across generations. The level of intellectual capacity visible in behaviour is thus a product of both factors, enculturation and capacity. Nothing quite like this process takes place in other species. There may be common patterns of learning in other species (even molluscs have 'customs' in this sense) and there are parent–child interactions in most complex animals, but these can be accounted for in terms of basic conditioning and learning theory, and should not be confused with the shared representational cultures of humans.

Other species start at basically the same level with each new generation; not so humans. Semantic content and even the cultural algorithms that support certain kinds of thinking can accumulate, and the symbolic environment can affect the way individual brains deploy their resources. This process of enculturation must have started very slowly, presumably with very gradual increments to a primate knowledge-base, but has evidently accelerated in an exponential manner in the modern period. The more rapid the change at the level of culture, the more crucial is the individual's capacity to 'copy' the current state of the representational culture, and also to contribute to its enrichment.

Since hominid enculturation is a special process that feeds back into the capacities of individual minds, I have chosen to classify hominid cognitive change in terms of the properties of the representational culture. Hominid cultures are classifiable not only in terms of their underlying cognitive support systems, but also in terms of their governing styles of representation. Many dimensions have been used to develop systems for classifying hominid cultures including diet, territory, tool-making, technology, food, kinship systems and shelter. These types of classification typically do not address cognition directly, although they might single out aspects of behaviour that are directly influenced by cognition.

The cognitive dimension is surely one of the most fundamental in setting the parameters of a culture; in fact, most other classifications of culture implicitly assume certain levels of cognitive development in the members of the culture. The cultural surface may be marked simultaneously by various changes, like the presence of better tools, different dwellings, complex social organization, elaborate decoration, and the presence of symbols; but the representational engine generating the changes observable at the cultural surface lies deeper, in the cognitive system, as it is deployed both in the brains of individuals and in the representational systems shared by the collectivity. It is not immediately obvious what cognitive dimensions are most important.

Language appears to be the most salient dimension; the emergence of language might have encompassed all major cognitive evolution in hominids. But one might also single out, in the Behaviourist/Connectionist tradition, a generally-improved 'learning' capacity, or capacity for forming new associations (see Jerison 1973). Thus hominid cultures could also be classified on the basis of their 'associative' or 'linguistic' capacity. Fetzer (1993) has suggested a third approach, based on Pierce's classification of symbol-systems, that lists five levels of symbolizing capacity into which all cultures might be placed. There are several other possible semiotic and cognitive systems of classification, but none seems to do justice to the collective dimension of cognition, or deal adequately with the apparent qualitative changes that marked the succession of hominid cultures, as they progressed from one stage to the next.

In order to develop a useful cognitive classification of culture we must keep four factors in mind. The first might be called an *individual* factor: culture reflects the cognitive capacities of the individuals making up a collectivity. For instance, social complexity demands the individual capacity to remember and service many relationships, and to 'read' complex situational cues (such as those used in tactical deception by monkeys). The second is a *distributed* factor which is, by definition, larger than the individual, and involves interactions with the social and physical environment. The distributed cognitive factor produces effects that are not easily predictable from the study of isolated individuals — for instance, languages, systems of writing, or human communication networks. The third factor, imposed by evolutionary theory, is a *fitness constraint*. Major changes in hominid cognition and culture had to meet the same kinds of constraints regarding reproduction, survival strategy, and so on, as any other aspect of evolutionary adaptation. The final factor is a *comprehensiveness constraint*, which precludes any proposal based on a narrow-band adaptation in some special domain — for instance a theory that focused on the human opposed thumb, erect posture, encephalization, or tool-making, in isolation. Any classification that attempts to be more than a pragmatic one-dimensional label must take into account both individual and distributed cognitive factors, and fitness constraints, and achieve an acceptable fit to a range of chronological data on the nature and rate

of anatomical, behavioural, and cultural change.

The primate cognitive functions that underwent radical change in hominids might include: (1) the range of voluntary non-verbal expression; (2) iconic and metaphoric gesture; (3) mutual sharing and management of attention; (4) self-cued rehearsal; (5) refinement and imitation of skills; (6) generative (self-cued and innovative) imagery; (7) improved pedagogy, and other means of diffusing skill and knowledge; (8) greatly increased speed of communication; (9) increased memory storage; (10) a capacity for voluntary (explicit) retrieval from memory; (11) new forms of representation (including words and larger narrative structures); (12) autobiographical memory; (13) shared representational control of emotions and instinctual reactions; (14) more complex overall structure (architecture) of representation and memory; and (15) the integration of material culture into the process of explicit knowledge representation.

The list could be made longer. Astonishingly, these massive changes were apparently achieved with about a 1 per cent change in DNA. This fact alone hints at the special nature of human cognitive evolution; much larger genetic distances between species can exist without correspondingly massive cognitive differences, and usually behaviour maps the physical inheritance of a species with exquisite precision. Chimpanzees are genetically much closer to humans than they are to most other primates, and yet their cognitive profile is far closer to that of other primates than it is to that of humans. This suggests that we need to invoke something more than genetically-entrenched changes in individual capacity in the case of hominid cognition.

Cognitive fundamentals of the enculturation process

The features special to human culture and cognition are complex and interrelated, and it appears unlikely that they evolved in parallel, each for a separate reason. There must be a simplicity to the underlying cognitive processes that support the emergence of complex human cultural features; our tentative list of changing primate functions must therefore be reducible to a much shorter list of cognitive fundamentals, sufficient to support the kinds of changes broadly encompassed within our structural model. In fact, this shortlist need contain only three items:

1. New, and *consciously retrievable*, kinds of representations must emerge at the top of the representational hierarchy;
2. these representations must be *inherently public* ways of modelling or expressing knowledge;
3. a novel, *semi-autonomous layer of culture* dependent on the first two factors must be in evidence.

My criterion for establishing major evolutionary 'transitions' in cognition (as opposed to minor changes) was that all three of these criteria had to be met in any proposed period of major change.

Memory retrieval is the first requirement. Self-triggered retrieval from memory is sometimes called 'explicit' memory, and in many ways it is the signature of human cognition. There are really only two possible routes to explicit memory: either an explicitly accessible address system was imposed retroactively on pre-existing primate memory systems, or a whole new set of inherently accessible representations was created. The first possibility seems highly improbable, given the complex design of the nervous system, and therefore I have opted for the second possibility, that a new kind of representational process supported the evolution of explicit memory capacity. This process, by which knowledge can be recoded into retrievable, or autocuable form, has been studied extensively in modern human infants, and is known as 'representational redescription' (Karmiloff-Smith 1992). A new representational process with this fundamentally novel feature of self-retrievability implies a new storage strategy in the brain. Moreover, recoded knowledge, whether verbal or non-verbal, is driven by *public* representational systems; humans simply do not develop such representations without some social involvement. Public systems are necessarily based on output (knowledge representations that cannot be 'expressed' in outputs stay locked inside the individual brain), and therefore involve the *production systems* of the brain. The result of an expanded range of voluntary outputs is an increase in the variability of behaviour and thought, and this is manifest in an explosion of public culture. These principles hold for each stage in human cognitive evolution; thus, for each putative stage or transition, we should look for a major change in each of these three parameters.

Major hominid transitions

Using these criteria, I have re-interpreted the major anatomical transitions in human evolution in terms of cognitive/cultural changes. Table 1.1 summarizes some of the main features of the proposed model (Donald 1991; 1993a,b,c; 1994; 1996). Cultures are classified by their dominant, or governing representational style. The starting point is ape culture; and the representational style of apes can be called

Table 1.1. *Proposed successive stages or 'layers' in the evolution of primate/hominid culture, using a cognitive criterion for classification. Note that each stage persists into the next, and continues to occupy its cultural niche; thus fully-modern human societies incorporate aspects of all four stages of hominid culture. The upper Palaeolithic seems to be situated pretty clearly in the oral-mythic cultural tradition, but it set the stage for later expansions.*

Stage	Species/period	Novel forms of representation	Manifest change	Cognitive governance
EPISODIC	primate	complex episodic event-perceptions	improved self-awareness and event-sensitivity	episodic and reactive; limited voluntary expressive morphology
MIMETIC (1st transition)	early hominids, peaking in *Homo erectus*; 4M–0.4 Mya	non-verbal action-modelling	revolution in skill, gesture (including vocal), non-verbal communication, shared attention	mimetic; increased variability of custom, cultural 'archetypes'
MYTHIC (2nd transition)	sapient humans, peaking in *Homo sapiens sapiens*; 0.5 Mya–present	linguistic modelling	high-speed phonology, oral language; oral social record	lexical invention, narrative thought, mythic framework of governance
THEORETIC (3rd transition)	recent sapient cultures	extensive external symbolization, both verbal and non-verbal	formalisms, large-scale theoretic artefacts and massive external memory storage	institutionalized paradigmatic thought and invention

episodic, because its representational style is concrete and reactive, that is, bound to environmental events. Apes are remarkably intelligent and socially complex, yet they have a very limited and stereotyped range of expressive outputs. This applies even to Savage-Rumbaugh *et al.*'s (1993) recent demonstrations with bonobos; they can comprehend a surprising amount of gesture and speech in an episodic context, but they do not themselves invent such representations or transcend specific context. Thus apes have never invented a public representational arena that can be transmitted across generations. Their problem is primarily one of output rather than comprehension.

This limitation must initially have been overcome by means of an archaic adaptation that is a conceptual 'missing link' between the episodic cultures of apes and human preliterate oral cultures. This early change was a revolution in motor skill that connected action to the remarkable social-perceptual skills we inherited from apes. Early hominids, possibly *Homo habilis*, but certainly *Homo erectus*, must have had the ability to rehearse and evaluate, and thus refine, their own actions. The implication of such a supramodal capacity to review and rehearse action was that the entire skeleto-motor repertoire of hominids became voluntarily controllable under the supervision of conscious perception, an ability I call non-verbal action-modelling, or mimesis. This greatly increased the morphological variability of explicitly retrievable, conscious hominid action.

The result was, I believe, the rapid emergence of the non-verbal background of human culture, a layer of 'mimetic' culture, that still persists in the form of numerous cultural variations in expression and custom (most of which people are unaware of and cannot describe verbally), elementary craft and tool use, pantomime, dance, athletic skill, and prosodic vocalization, including group displays. The mimetic dimension of human culture is still supported by a primarily analogue mode of representation, similar in its imagery-driven operating principles to that described by Paivio (1991), and it generated a variety of manufactured artefacts as well as dramatic changes in hominid living patterns. Mimetic culture supports limited public storage and transmission of knowledge by non-verbal means — sharing of attention and gaze, uses of custom and gesture, re-enactments, certain directed group behaviours, and so on. These gradually created a new class of non-verbal representations that could change and accumulate, albeit very slowly, over generations. This very slow-moving prototype of human culture was a successful adaptation that could have endured on its own, without what we strictly define as language, for well over a million years.

A second hominid cognitive transition led from mimetic culture to speech and a fully-developed oral-mythic culture. This emerged over the past several hundred thousand years, culminating in the speciation of modern *Homo sapiens*. Oral culture is a specialized adaptation that complements, but does not replace the functions served by mimetic culture. I have labelled this layer of culture 'mythic' because its governing representations consist of a shared narrative tradition — an oral, public, standardized version of reality permeated by mythic archetypes and allegories, that can exert direct influence over the form of human thought and convention. The central structures of oral-mythic culture emerged as the hominid capacity for language became universal. Its introduction involved a whole new class of representations and corresponding storage media in the brain. It also introduced a level of culture that

still remains firmly at the centre of human social existence. Language also introduced a much more powerful means of explicit recall from memory than the imagery-driven retrieval enabled by mimetic representation; linguistically mediated recall is by far the most salient form of explicit memory retrieval known to modern humans. In many ways, the essence of language lies in its power to address and organize knowledge, and make it accessible to further reflection.

These two changes set the stage for the later explosion of material culture in modern humans. Thus there were, in the human evolutionary succession, two archaic stages that gave humans their distinctive *non-verbal* intellectual skills, as well as their *verbal* intellectual capacities. The second transition also undoubtedly led to a further expansion of non-verbal capacities. In fact, oral-mythic culture encompassed all the mimetic capacities of humans; mimetic culture endured as its own semi-autonomous realm of ritual, custom and other non-verbal forms of expression. But typically in such cultures, despite the strong presence of mimetic representations, it is the oral realm that dominates. This complex culture, grafted onto an underlying cognitive architecture that remained basically primate in structure, provided the cognitive inheritance of all humans who lived in the Upper Palaeolithic.

The transition from preliterate to symbolically-literate societies began in the Upper Palaeolithic and has been marked by a long, and culturally cumulative, history of visuosymbolic invention. It has also been marked by a radical new development: the externalization of memory storage. External memory (as opposed to internal, or 'biological' memory) involves completely new memory media with properties that are fundamentally different from those of biological memory. Table 1.2 illustrates some of these properties. If we were speaking of computers, we would have no difficulty accepting that a system that could use the storage properties listed in the right column of Table 1.2 (external memory) would have radically different capabilities from a system limited to those in the left column (internal or biological memory). Note that I am speaking of the cognitive capabilities of the whole social system, as well as those of individuals embedded within the system.

External symbolic technologies enabled humans to create qualitatively new types of representations, eventually yielding powerful evocative devices like paintings, sculptures, maps, mathematical equations, scientific diagrams, novels, architectural schemes, government economic reports, and so on. These elaborate devices serve an important cognitive engineering function: they set up states in the individual mind that cannot otherwise be attained. Note that this is not to say that either symbolic invention or external memory could trigger new innate mental *capacities*. Rather, the new representational possibilities emerged from a developing symbiosis with the external symbolic environment, the basis for a particularly radical form of enculturation.

This symbiosis with symbols supported the growth of a novel, semi-autonomous realm of human culture, based largely on an institutionalized literate élite. The algorithms that developed into paradigmatic thought have been cultivated gradually over thousands of years of experience with symbolically-driven cultures. Theoretic skills include a wide range of thought-algorithms that are by no means innate, and are inconceivable outside the context of a highly symbol-dependent society. I call this third stage 'theoretic' culture, because where the superstructure of external symbolic control has become established to a sufficiently high degree, it has become the governing mode of representation. Paradigmatic or logico-scientific thought, a style of thinking quite different from the narrative thought skills of oral culture, is not innate to the human brain or even to the larger culture; rather it consists of algorithms that evolved in a close iterative symbiosis with external symbols.

Table 1.2. *Properties of internal and external memory compared.*

Internal Memory Record (engram)	External Memory Record (exogram)
fixed physiological media	virtually unlimited physical media
constrained format, depending on type of record, and cannot be re-formatted	unconstrained format, and may be re-formatted
impermanent and easily distorted	may be made much more permanent
large but limited capacity limited size of single entries (e.g. names, words, images, narratives)	overall capacity unlimited single entries may be very large (e.g. novels, encyclopaedic reports; legal systems)
retrieval paths constrained; main cues for recall are proximity, similarity, meaning	retrieval paths unconstrained; any feature or attribute of the items can be used for recall
limited perceptual access in audition, virtually none in vision	unlimited perceptual access, especially in vision
organization is determined by the modality and manner of initial experience	spatial structure, temporal juxtaposition may be used as an organizational device
the 'working' area of memory is restricted to a few innate systems, like speaking or subvocalizing to oneself, or visual imagination	the 'working' area of memory is an external display which can be organized in a rich 3-D spatial environment
literal retrieval from internal memory achieved with weak activation of perceptual brain areas; precise and literal recall is very rare, often misleading	retrieval from external memory produces full activation of perceptual brain areas; external activation of memory can actually appear to be clearer & more intense than 'reality'

Like oral-mythic culture, this level of culture is dominated by a relatively small élite with highly-developed literacy-dependent cognitive skills, and its principal instruments of control — codifed laws, economic and bureaucratic management, reflective scientific and cultural institutions — are external to the individual memory system. This type of representation has gradually emerged as the governing level of representation in modern society.

Theoretic culture is still in the formative stage, and even the most recent post-industrial human cultures must encompass all these collective cognitive mechanisms and cultural levels at once. Recent research on child development supports this notion; the cognitive enculturation of modern children is highly complex, as they are led through a tangled web of representational modes and complex institutionalized algorithms (Nelson 1996; Karmiloff-Smith 1992). In effect, we have become complex, multi-layered, hybrid minds, carrying within ourselves, both as individuals and as societies, the entire evolutionary heritage of the past few million years.

Merlin Donald
Department of Psychology
Queen's University
Kingston, Ontario
K7L 3N6
Canada

References

Bickerton, D., 1990. *Language and Species*. Chicago (IL): University of Chicago Press.

Bradshaw, J. & L. Rogers, 1993. *The Evolution of Lateral Asymmetries: Language, Tool Use and Intellect*. San Diego (CA): Academic Press.

Calvin, W.H., 1993. The unitary hypothesis: a common neural circuitry for novel manipulations, language, plan-ahead, and throwing?, in Gibson & Ingold (eds.), 230–50.

Chase, P.G., 1993. Middle Palaeolithic symbolism: a review of current evidence and interpretations. *Journal of Anthropological Archaeology* 6, 263–98.

Chomsky, N., 1993. *Language and Thought*. Wakefield (RI): Moyer Bell.

Corballis, M.C., 1991. *The Lopsided Ape: the Evolution of the Generative Mind*. Oxford: Oxford University Press.

Damasio, A.R. & H. Damasio, 1994. Cortical systems for the retrieval of concrete knowledge: the convergence zone framework, in *Large-Scale Neuronal Theories of the Brain*, eds. C. Hoch & J.L. Davis. Cambridge (MA): MIT Press.

Davidson, I. & W. Noble, 1989. The archaeology of perception. *Current Anthropology* 30, 125–55.

Dennett, D., 1991. *Consciousness Explained*. Boston (MA): Little, Brown.

Dennett, D. & M. Kinsbourne, 1992. Time and the observer: the where and when of consciousness and the brain. *Behavioral and Brain Sciences* 15, 183–206.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Donald, M., 1993a. Human cognitive evolution: what we were, what we are becoming. *Social Research* 60, 143–70.

Donald, M., 1993b. Précis of *Origins of the Modern Mind*. *Behavioral and Brain Sciences* 16, 737–91.

Donald, M., 1993c. *An Evolutionary Perspective on Cognition and Literacy*. Kingston: Queen's University Mathematics, Science and Technology Education Group.

Donald, M., 1994. Representation: ontogenesis and phylogenesis; a commentary on Karmiloff-Smith's *Beyond Modularity*. *Behavioral and Brain Sciences* 17, 714–15.

Donald, M., 1996. The role of vocalization, memory retrieval and external symbols in cognitive evolution: a reply to additional commentaries. *Behavioral and Brain Sciences* 19, 155–64.

Edelman, G.M. & L.H. Finkel, 1984. Neuronal group selection in the cerebral cortex, in *Dynamic Aspects of Neocortical Function*, eds. G.M. Edelman, E.W. Gall & W.M. Cowan. New York (NY): Wiley, 653–95.

Falk, D., 1987. Hominid paleoneurology. *Annual Review of Anthropology* 16, 13–30.

Fetzer, J., 1993. Review of Merlin Donald's *Origins of the Modern Mind*. *Philosophical Psychology* 6, 339–41.

Fodor, J., 1983. *The Modularity of Mind*. Cambridge (MA): MIT Press.

Gamble, C., 1994. *Timewalkers: the Prehistory of Global Colonization*. Cambridge (MA): Harvard University Press.

Gibson, K. & T. Ingold (eds.), 1993. *Tools, Language and Cognition in Human Evolution*. Cambridge: Cambridge University Press.

Graf, P. & D. Schacter, 1985. Implicit and explicit memory for new associations in normal and amnesiac subjects. *Journal of Experimental Psychology: Learning, Memory and Cognition* 11, 501–18.

Greenfield, P.M., 1991. Language, tools and the brain: the ontogeny and phylogeny of hierarchically-organized sequential behavior. *Behavioral and Brain Sciences* 14, 531–95.

Jerison, H., 1973. *The Evolution of the Brain and Intelligence*. New York (NY): Academic Press.

Karmiloff-Smith, A., 1992. *Beyond Modularity: a Developmental Perspective on Cognitive Science*. Cambridge (MA): MIT Press.

Kimura, D., 1976. Neuromotor mechanisms in the evolution of human communication, in *Neurobiology of Social Communication in Primates*, eds. H.D. Steklis & M.J. Raleigh. New York (NY): Academic Press.

Lieberman, P., 1984. *The Biology and Evolution of Language*. Cambridge (MA): Harvard University Press.

Lieberman, P., 1991. *Uniquely Human: the Evolution of Speech,*

Thought and Selfless Behavior. Cambridge (MA): Harvard University Press.

McGrew, W.C., 1992. *Chimpanzee Material Culture: Implications for Human Evolution*. Cambridge: Cambridge University Press.

McGrew, W.C. & L.F. Marchant, 1992. Chimpanzees, tools, and termites: hand preference or handedness? *Current Anthropology* 32, 114–19.

MacLean, P.D., 1973. *A Triune Concept of the Brain and Behavior*. Toronto: University of Toronto Press.

McNeill, D., 1991. *Hand and Mind: What Gestures Reveal about Thought*. Chicago (IL): University of Chicago Press.

Mellars, P., 1989. Technological changes across the Middle–Upper Palaeolithic transition: economic, social and cognitive perspectives, in Mellars & Stringer (eds.), 338–65.

Mellars, P. & C. Stringer (eds.), 1989. *The Human Revolution: Behavioural and Biological Perspectives on the Origins of Modern Humans*. Princeton (NJ): Princeton University Press.

Nelson, K., 1996. *Language in Cognitive Development: Emergence of the Mediated Mind*. Cambridge: Cambridge University Press.

Paivio, A., 1991. *Images in Mind: the Evolution of a Theory*. New York (NY): Harvester Wheatsheaf.

Passingham, R.E., 1982. *The Human Primate*. New York (NY): Freeman.

Pinker, S., 1994. *The Language Instinct: How the Mind Creates Language*. New York (NY): Morrow.

Pinker, S. & P. Bloom, 1990. Natural language and natural selection. *Behavioral and Brain Sciences* 13, 707–84.

Premack, D., 1987. *Gavagai*. Cambridge (MA): MIT Press.

Savage-Rumbaugh, E.S., J. Murphy, R.A. Sevcik, K.E. Braake, S.L. Williams & D. Rumbaugh, 1993. *Language Comprehension in Ape and Child*. (Monographs of the Society for Research in Child Development 233, v. 58.) Chicago (IL): University of Chicago Press.

White, R., 1989a. Production complexity and standarization in Early Aurignacian bead and pendant manufacture: evolutionary implications, in Mellars & Stringer (eds.), 366–90.

White, R., 1989b. Toward a contextual understanding of the earliest body ornaments, in *The Emergence of Modern Humans: Biocultural Adaptations in the Later Pleistocene*, ed. E. Trinkhaus. Cambridge: Cambridge University Press, 211–31.

Wynn, T., 1989. *The Evolution of Spatial Competence*. Champaign-Urbana (IL): University of Illinois Press.

Chapter 3

Palaeolithic Origins of Artificial Memory Systems: an Evolutionary Perspective

Francesco d'Errico

Humans are the only species capable of creating means of recording, storing and transmitting information outside the physical body (artificial memory systems or AMS). To investigate the possible origin of these devices in the Palaeolithic, a theoretical model has been developed through examination of the ethnographic record and from study of the rules which govern the use of AMS codes. Discussion of the applicability of the model to the archaeological material reveals that the technological analysis of marks derived from experimentally determined diagnostic criteria provides methods for identifying certain types of AMS, such as those based on accumulation of information through time. The analytical methods used in examining Palaeolithic marks, here summarized, are used to analyze several Palaeolithic marked objects. It is concluded that Anatomically Modern Humans used AMSs at least from the beginning of the Upper Palaeolithic and that such systems played a major role in modifying human cognition.

Several models of the evolution of human cognition have been developed in recent years in attempts to identify and define the major stages involved and to characterize the mental processes at work (Byrne & Whiten 1988; Eccles 1989; Foley & Lee 1991; Aiello & Dunbar 1993; Gibson & Ingold 1993; Bradshaw & Rogers 1995; Mellars & Gibson 1996). The specialists concerned insist, in their models, on the primary role played by the emergence of symbolic forms of behaviour, and on the ensuing ability to preserve and use information stored away from the human body (Cherry 1980; Festinger 1983; Lindly & Clark 1990; Chase 1991; 1994; Goonatilake 1991; Davidson & Noble 1989; 1993; Donald 1991; Duff *et al.* 1992; Byers 1994; Knight *et al.* 1995; Mellars 1989; 1991; 1996; Mithen 1996; Thierry *et al.* 1996; see also Leroi-Gourhan 1964 and Goody 1977 for precursory statements). For some of these cognitive evolution models it is the interconnected genetic, cultural, and exosomatic information itself which evolves as a self-organizing mechanism, determining the ever-increasing complexity of communication networks (Goonatilake 1991). In other models (Donald 1991; 1993; 1996), each new stage, mimetic, mythic, theoretical, is seen in terms of a differentiated organization and use of memory: on this basis external memory, with its use of external symbols, represents the ultimate stage in cognitive evolution.

Whatever the model adopted, however, there always comes a time when theorists turn to archaeology in search of supporting evidence. Unfortunately their discussion of such evidence rarely takes into account the critical approach of modern archaeology. Equally, although some theorists' models do offer helpful insights into the evolution of mental abilities, most are too loosely defined to serve as a valuable heuristic tool. Often the proposed generalizations seem little more than merely plausible interpretations of artefactual data and not the testable theories they should be (Bell 1994). In this respect, perhaps, we would do well to heed the advice of Mellars & Gibson (1996) when they point out the

role of the archaeologist in developing methods of analysis to explore the overall significance of archaeological material, thus paving the way for a solid data base on which any theoretical superstructure might be built.

In the spirit of such an approach, I have chosen to focus on a particular aspect of Donald's 'external symbolic storage' or Goonatilake's 'exosomatic information', the moment at which humans were able to produce artificial memory systems (AMSs), i.e. physical devices specifically conceived to store and recover coded information. Although writing is, without doubt, the system which has most affected the development of human societies, at least since the invention of printing, it is likely that other types of AMS were used both before and after the adoption of writing.

The first possible AMSs reported from Upper Palaeolithic sites were interpreted as '*marques de chasse*' or 'systems of notation' (Lartet & Cristy 1865–75). More than a century later, however, their interpretation remains controversial.

In the last thirty years several authors, Marshack in particular, have examined Upper Palaeolithic marked objects in an attempt to show that they served as systems of notation (1964; 1970; 1972a,b,c; 1988; 1991a,c). Marshack has most often interpreted these objects as having notations based on lunar phases. Many criticisms have, however, been levelled at this work by authors such as White (1982), d'Errico (1989; 1992; 1995a; 1996a), Robinson (1992), and Elkins (1996, with comments). A major criticism is that Marshack has never proposed a testable theoretical framework and an explicit methodology. Although Marshack claims that he has identified systems of notation, he does not explain what he means by this term. What exactly is 'a system of notation'? How many types of 'notation' can humans develop? How many of them will we be able to identify among the archaeological material? All these questions remain unanswered. Indeed the analytical methods used by Marshack in studying objects have never been clearly described nor validated by replicative experiments. Thus when he describes the way in which marks were produced on an object, or identifies changes of tool, we do not know on what basis he is making this claim.

In line with previous work (d'Errico 1991; 1995a,b; d'Errico & Cacho 1994), I will show that the study of ethnographic AMSs can provide interpretative guidelines to be used for identifying archaeological AMS. We need a technological analysis of Palaeolithic marked objects before we can discuss their significance and their possible interpretation as AMSs. After addressing the controversial question of the possible use of AMSs in the Lower and Middle Palaeolithic, my theoretical and analytical tools will be tested by studying several objects dating from different periods of the Upper Palaeolithic. The results will provide the basis for a working hypothesis for the evolutionary development of AMSs during the Upper Palaeolithic.

	Raw material							**Function**							
	incised wood or bamboo sticks	incised ivory	pebbles	strings (wool, skin, vegetal) with knots	shells	leather	miscellaneous	praying	keeping records of objects or beings	keeping records of cattle	keeping records of transactions	serving as calendars	transmitting messages	serving as memory aids	serving as hunting marks	keeping records of proverbs/songs
Americas	2	0	0	3	1	0	1	1	4	0	0	1	1	0	0	0
Europe	4	0	2	0	0	0	0	2	0	3	1	2	0	0	0	0
Africa	2	0	0	2	2	1	2	1	3	1	0	0	2	0	1	2
Asia	8	1	0	8	0	0	0	0	6	1	0	1	5	2	0	0
Totals	**16**	**1**	**2**	**13**	**3**	**1**	**3**	**4**	**13**	**4**	**1**	**4**	**8**	**2**	**1**	**2**

Figure 3.1. *Provisional data base of Artificial Memory Systems other than writing, used by different human groups around the world. The figures indicate types and not single systems.*

Theoretical and analytical tools

My goal was to examine the ethnographic record in search of general principles that would make it possible to reduce information to a form that can be recovered by humans. The purpose of this study was not to establish a direct analogy between the ethnographic and the Palaeolithic record (Marshack 1974; 1985); the dangers of this approach have already been highlighted many times (Gould & Watson 1982; Wylie, 1985; 1988).

To this end I created a provisional data base of 50 relatively simple AMSs, used all over the world for a variety of purposes in many different cultural and social contexts (Fig. 3.1). This sample includes rosaries, notched sticks, engraved slabs, strings with knots or shells, objects kept in nets and so on. The purpose of each device was studied, along with the material in which it was made, whether it would survive in the archaeological record, and whether it could be recognized as an artefact or identified as an AMS. Particular attention was paid to the ways in which each system worked: the way in which the information was recorded, processed and then recovered.

Examination of the ethnographic record revealed that up to four major factors can intervene in any AMS code: a) the morphology of elements, b) the spatial distribution of the elements, c) accumulation through time, and d) the number of elements (Fig. 3.2).

If we take as as an example the Catholic rosary we find that its code is based on the spatial distribution of the information-bearing elements and on the morphology of those elements: in this case beads, separated by chains of different length (d'Errico 1995b). The order of the beads indicates the order of the prayers; the chain length and/or the bead dimensions indicate the type of prayer.

Take a tally-stick and carve a notch on it every time something happens or an object has to be recorded, then its code is based on the accumulation through time of information-bearing elements. Since notches cannot be distinguished by the naked eye, their morphology cannot play a role in the code, and nor does spatial distribution either. It is possible to carve a new notch in the space still free on the stick or between existing notches without changing the information being stored.

Yet another example is the system of communication called Aroko, used by the Jebu of West Africa. This AMS consists of chains of shells carrying different messages according to the number of shells and their reciprocal position. The number and the spatial distribution of the elements are the two factors organizing the Aroko code; a different meaning is attributed to different sets of shells.

As mentioned, the ethnographic evidence shows that each code can depend on one, two, three or even all of the four factors cited above. In all it is possible to define up to fifteen basic codes. Several variants can be envisaged, however, depending on the hierarchical organization of these factors within the code. To give an example of hierarchical organization, let us consider the Inca AMS called 'quipu'. A quipu consists of a number of cords, of different lengths and colours, suspended from a topband. The position and type of knot on each cord stand for objects and beings. The code employed here is one based on spatial distribution and element morphology. The spatial distribution is organized hierarchically in two steps (order of the cords and position of the knots). The morphology of the elements is also organized

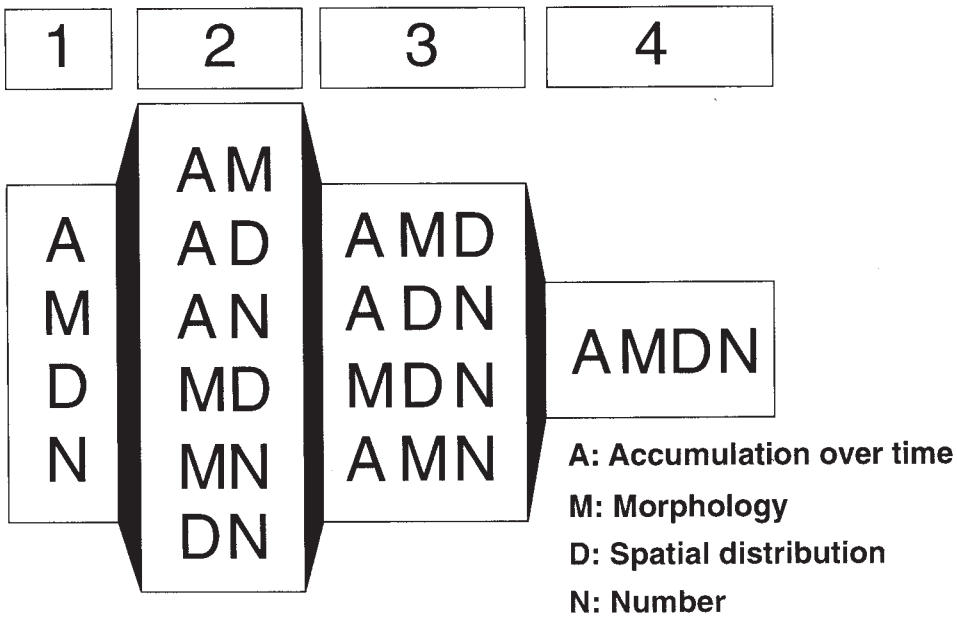


Figure 3.2. *Possible associations between factors organizing an AMS code (see text).*

hierarchically (colour of the cords and type of knot).

My model takes into account the way in which information is processed. In a rosary, information is processed only through tactile perception; in the quipu both tactually and visually. I also consider the efficiency of each system: the quantity and quality of stored information, the possibility of updating information, as well as the effort required to learn the code. The usefulness of this exploratory approach is that it classifies AMSs on the basis of the formal, and probably invariable, elements that play a rôle in elaborating any type of AMS code and not on features proper to each specific AMS, such as its function or the meaning attributed to particular signs. The latter features are not normally preserved in the prehistoric record. Thus I use this model to ask questions about how these artefacts were used, not about what kind of information was stored and recovered, because only the former kind of question can be answered by archaeological analysis. Hence I am not interested in establishing a classification of these devices, as was done in the past for writing systems (Saussure 1922; Gelb 1952; Pulgram 1976) but in developing an exploratory heuristic tool to be used in the interpretation of archaeological data. I draw attention here to the example of Harris who has developed a similar approach for the analysis of writing systems (1986; 1995). Several concepts defined by this author are pertinent here, such as the distinction he makes between *tokens* and *emblems*. The former are signs based on a one-to-one correlation between single items (notches on a tally stick, beads on an abacus, ticks or crosses on a list, etc.); the latter are signs based on a one-to-many correlation, by virtue of which the 'many' are regarded as forming a single class (potter's marks, logos, national flags, etc.). Signs which function simultaneously as emblems and tokens are described as *duplex* signs.

My analysis of modern AMSs suggests that it is the code and raw material type that will determine the likelihood or not of securely identifying archaeological AMSs. It will be hard, for example, to prove that strings linking shells, teeth or other pendants were used during the Upper Palaeolithic in a way similar to that described for the rosary, and not as pieces of body ornament bearing a different kind of meaning.

The Upper Palaeolithic archaeological record, however, includes hundreds of marked bone objects. These objects constitute a more suitable basis for identifying possible AMSs. Repeated changes of tool, variations in marking techniques, in the arrangement of marks and in mark morphology can provide clues to support an interpretation as an AMS. When marks are created by stone tools, for example, a change of tool will probably take place between each new stage of marking if the periods stages are relatively long. If we change between tool produces morphological differences visible to the naked eye, these different morphologies can be interpreted as the being result of the craftsman's choice. If, however, changing a tool does not produce visible changes in the morphology of marks, then it is reasonable to consider such changes as epiphenomenonal owing to the accumulation of marks over time. Therefore criteria for identifying certain types of AMS, like those based on accumulation of information through time, depend on the technological analysis of marks.

Palaeolithic marks include sequences of single-stroke lines (made by a single movement of a point), notches (produced by a single or repeated movement of a cutting edge), and microincisions (produced by the pressure, percussion or rotation of a point) carved on different types of material (bone, ivory, antler, stone). Microscopic analysis of experimental and archaeological marks, carried out in the last 15 years by optical and scanning electron microscope, both on the originals and on high quality resin replicas, have provided diagnostic criteria: 1) to identify the techniques used by prehistoric engravers; and 2) to establish whether morphological changes between marks are due to a change of tool, a change of marking technique, or to the breaking and resharpening of the point.

Interesting results we have been obtained using computerized measuring methods for profile measurement and image analysis systems (d'Errico 1995b; 1996b). It has been shown, for example, that sets of notches produced by a single tool can be distinguished from sets produced by several tools, by comparing their profiles and by studying the variation of the angles formed by the notch walls (d'Errico 1991). Previous work has shown that, in single stroke lines, the width of the mark, its section, and the distances between internal grooves allow the identification of marks made by the same tool, and that clear changes in these features often correspond to changes of tool. Density profiles of marks (Fig. 3.3), obtained by applying image analysis software to digitized images of the marks, have provided a new way for comparing the mark section and quantifying morphological differences between the marks (d'Errico 1995b). Similarily, plotting the dimensional values of experimental marks produced by pressure or by indirect percussion, often makes it possible to distinguish between groups of marks made by different tools.

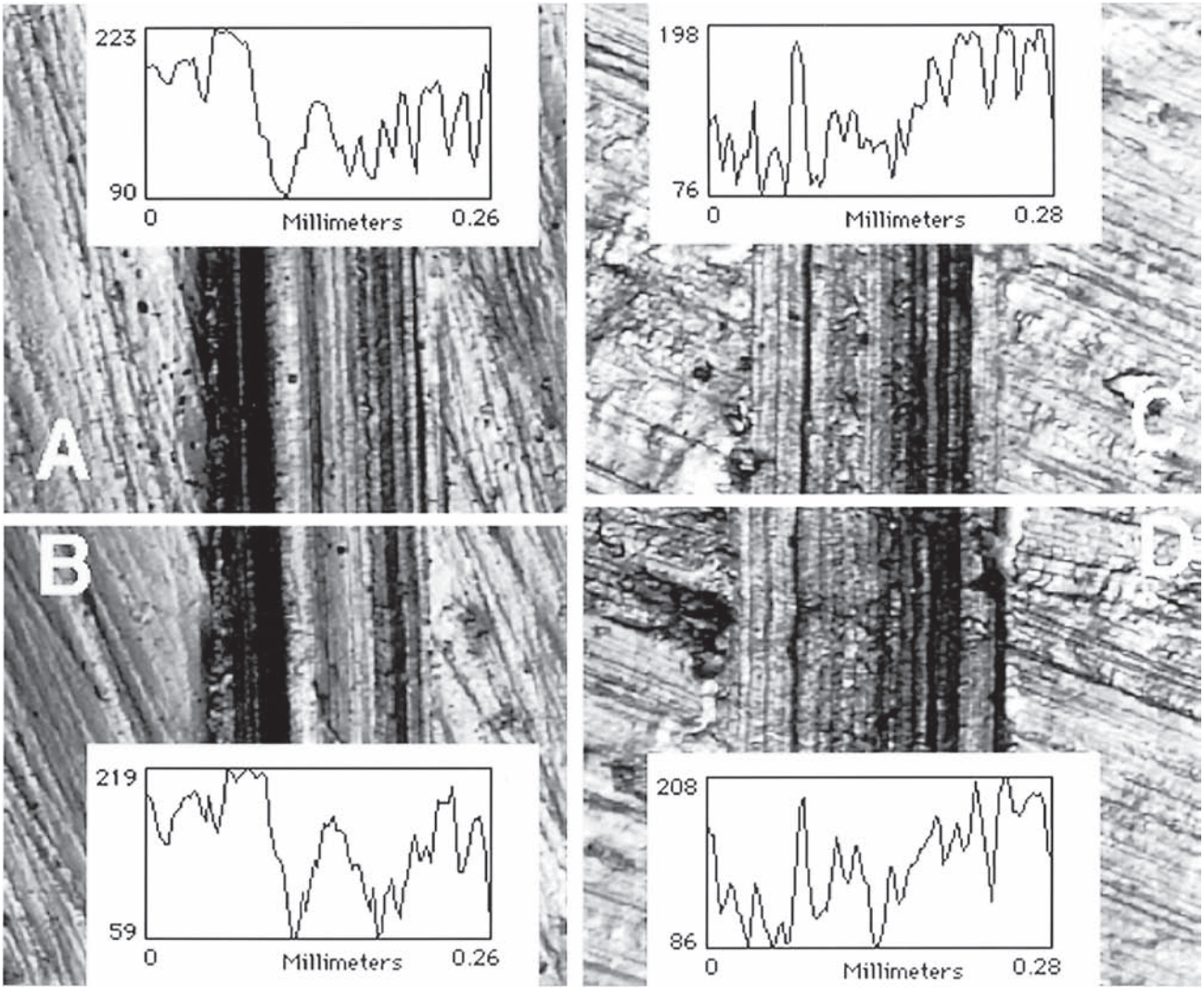


Figure 3.3. *Portions of experimental single stroke lines engraved by flint points on antler, observed in transmitted light by means of resin replicas. The point used to engrave two lines, A and B, was different from that used to engrave lines C and D. The density-profile plots of these four lines allow a visualization of morphological differences in the groove section.*

All these methods have provided for each marking technique a range of morphological and statistical diagnostic criteria on the basis of which we can now recognize marks produced by the same tool, and distinguish changes of tool from other modifications such as resharpening, wear or changes in the hand motion.

Analytical techniques

Hitherto I have measured notch profiles using computerized measuring stations for profile measurement and representation. The measuring station records a notch profile by using stylus arm connected to a drive unit. The computer compensates automatically for measuring errors resulting from the radius of the stylus tip and produces enlargements (up to 1000×) of selected portions of the profile. The software allows insertion of best-fit lines and best-fit circles into the profile, as well as the computation of geometrical elements (angles, radii, distances, etc.). The major drawback of this instrument, apart from its high price, lies in its dimensions and weight, both of which make it virtually impossible to transport to a museum or another laboratory. An additional problem is caused by the fact that the

stylus enters into direct contact with the specimens. Even if the pressure on the object surface can be reduced to a few micrograms, the risk of damaging an original object with the sharp point of the stylus cannot be eliminated. Thus the study of Palaeolithic notches must be carried out on resin replicas of archaeological specimens. This, however, limits the analysis to well-preserved pieces that can be replicated without damaging the surface.

The need to use resin replicas and the risk of damaging the object with the stylus are obviated if one uses optical surface profilers (d'Errico 1996b). These instruments, based on the principle of the optical triangulation of laser light, allow a 2- and 3-dimensional reconstruction of very small surfaces without any contact with the object. Many morphological and metrical variables can thus be recorded. Their use, however, is still limited by their high price and excessive weight.

A convenient alternative method, tested here,

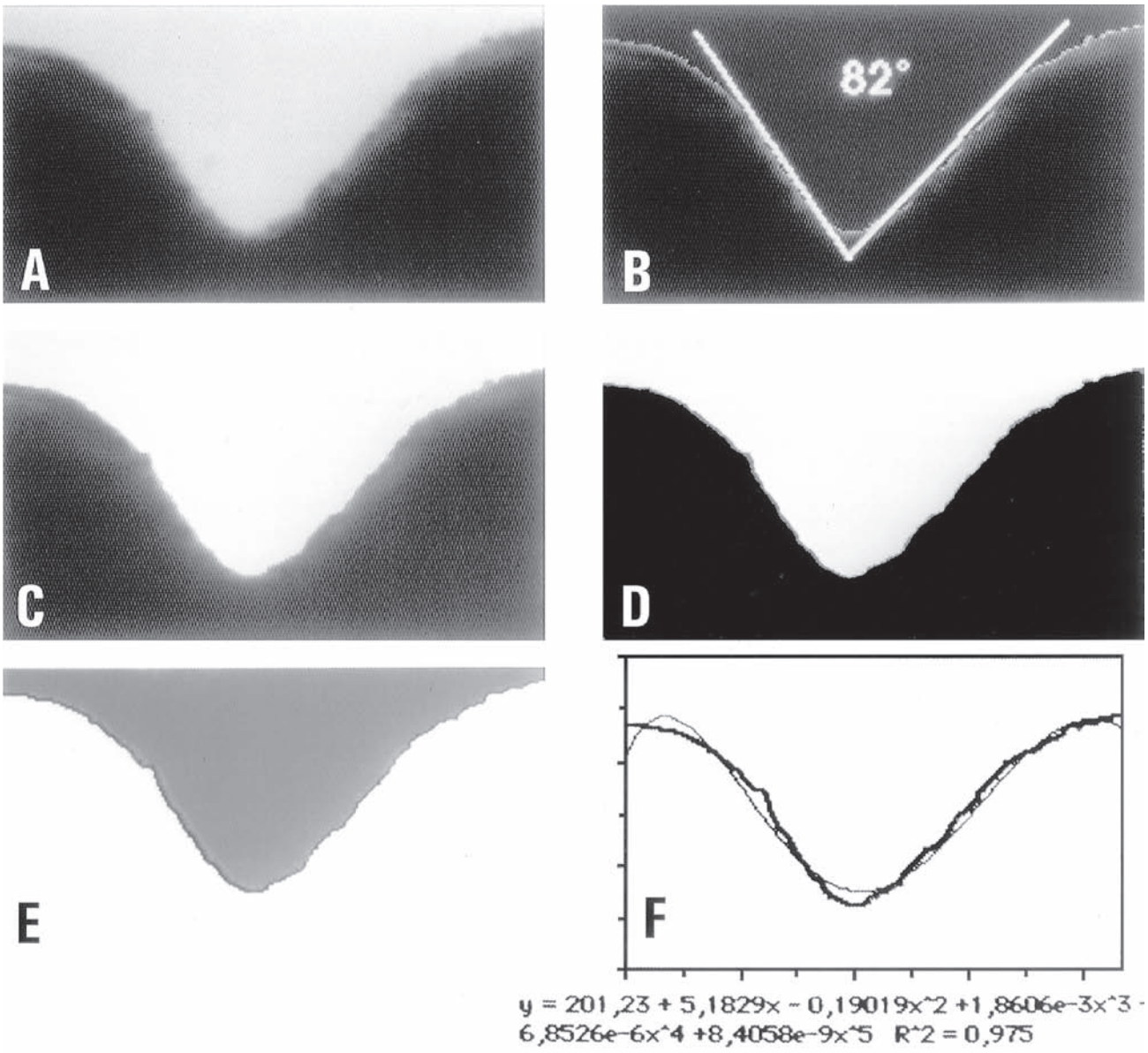


Figure 3.4. *Study of a notch profile by image analysis. Once the image has been digitized (A), the background is thresholded (B) using the density slice command and changed to white (C). The object outline is changed to black (D) using the same procedure. The density-profile tool generates a plot (E) from which the numerical coordinates are recovered and reduced to a polynomial equation (F).*

consists of placing the object or its replica under a stereomicroscope equipped with both transmitted and reflected light. The notch is positioned so that its profile is in the lens axis. The image is digitized using a CCD camera mounted on the microscope and connected to a desktop or portable computer equipped with a frame grabber card. By means of a sequence of image enhancement steps the curved line of the profile is transformed into numerical values (Fig. 3.4). The plot so produced can be used for visual comparison with plots of other notches. Quantification of morphological differences between profiles can be obtained by measuring angles and by computing polynomial equations or conventional Fourier functions (Gero & Mazzullo 1984; Lestrel 1989). The use of the measuring station described above and of the image analysis system on the same experimental and archaeological sets of notches has provided comparable data.

AMS use in the Lower and Middle Palaeolithic?

Evidence for symbolic behaviour during the Lower and Middle Palaeolithic is limited and controversial (see for example Marshack 1991b; Simek 1992; Bednarik 1995; Bahn 1996; Chase & Dibble 1987; 1992; Davidson & Noble 1993; White 1992; Knight *et al.* 1995; Mellars 1996; Gibson & Mellars 1996). In a recent work, d'Errico & Villa (1997) have demonstrated that certain putative Lower and Middle Palaeolithic engravings on bones, such as Pech de l'Azé, Cueva Morin, and Stranska Skala, are in reality impressions of vascular grooves and that most of the putative 'pendants' of this period should be interpreted as bone fragments partially regurgitated by hyenas. This consequently reduces the already small number of Lower and Middle Palaeolithic objects considered by some authors as proof of non-utilitarian activities. The remaining objects (Fig. 3.5) come from 11 European sites (Bilzingsleben, La Ferrassie, Bacho Kiro, Suard, Marillac, Vaufrey, La Ferrassie, Ermitage, Morin, Beneito, Temnata). Only a few of these objects, however, display marks which could not be explained as the result of utilitarian activities. An even smaller sample show patterns which could be the expression of an AMS code.

It should be clear that the recovery of information in AMSs based on serial markings requires patterns allowing a visual and/or tactile discrimination of the signs. This implies a certain degree of isomorphism of the signs and their arrangement in a way which would enable them to be 'read'. If we judge from the representations of these objects, this condition is satisfied for markings such as those on objects from Bilzingsleben, La Ferrassie, Cueva Morin and Temnata. Unfortunately, none of these markings was submitted to a microscopic analysis in order to verify the possible anthropogenic origin of the marks, to find evidence that they were produced deliberately and to reconstruct the marking procedure in a detailed and reliable way. In the absence of this data, it is difficult, if not impossible, to assess the significance of this material for the question in hand.

The end of the Middle Palaeolithic, characterized in western Europe by technocomplexes such as the Uluzzian in Italy, and the Châtelperronian in France and Spain, shows a qualitative change in the archaeological record. At the Grotte du Renne (in the Arcy-sur-Cure cave complex of northern France), the Châtelperronian levels have yielded a varied collection of personal ornaments (Fig. 3.6) consisting of perforated or grooved teeth of different species, and pendants made of shell, ivory and bone (Leroi-Gourhan & Leroi-Gourhan 1965; Taborin 1990). Three small tubes, made of bird bones, show regularly spaced notches. Sets of notches were also produced on ribs, awls and bone points. Seven other Châtelperronian sites, apart from the Grotte du Renne, have yielded personal ornaments, consisting of perforated and sawn teeth and perforated shells of different species, as well as bone fragments with sets of incisions. Bone industry and perforated shells also occur at some contemporary Uluzzian sites of the Italian peninsula (Palma di Cesnola 1993).

The recent identification of a Neanderthal earbone in the Châtelperronian layers of Arcy (Hublin *et al.* 1996) seems to confirm, as already suggested by the Saint Césaire burial (Lévêque & Vandermeersch 1980) and by some human remains at other sites, that Neanderthals were authors of the Châtelperronian and Uluzzian assemblages. The presence of bone tools, personal ornaments and apparently 'modern' stone tools in Châtelperronian and Uluzzian contexts is variously interpreted: 1) as the result of an acculturation of final Neanderthal populations by anatomically modern humans (Stringer & Gamble 1993; Bar-Yosef 1996; Mellars 1996; Hublin *et al.* 1996); 2) as proof of collecting by Neanderthals of objects abandoned by modern humans; or 3) as the result of post-depositional disturbances, i.e. the objects are considered as Aurignacian artefacts introduced into the Châtelperronian layers by post-depositional mixing (White 1992).

A recent work, however, challenges these interpretations (d'Errico *et al.* 1998). A new assessment of the stratigraphic, chronological and archaeological

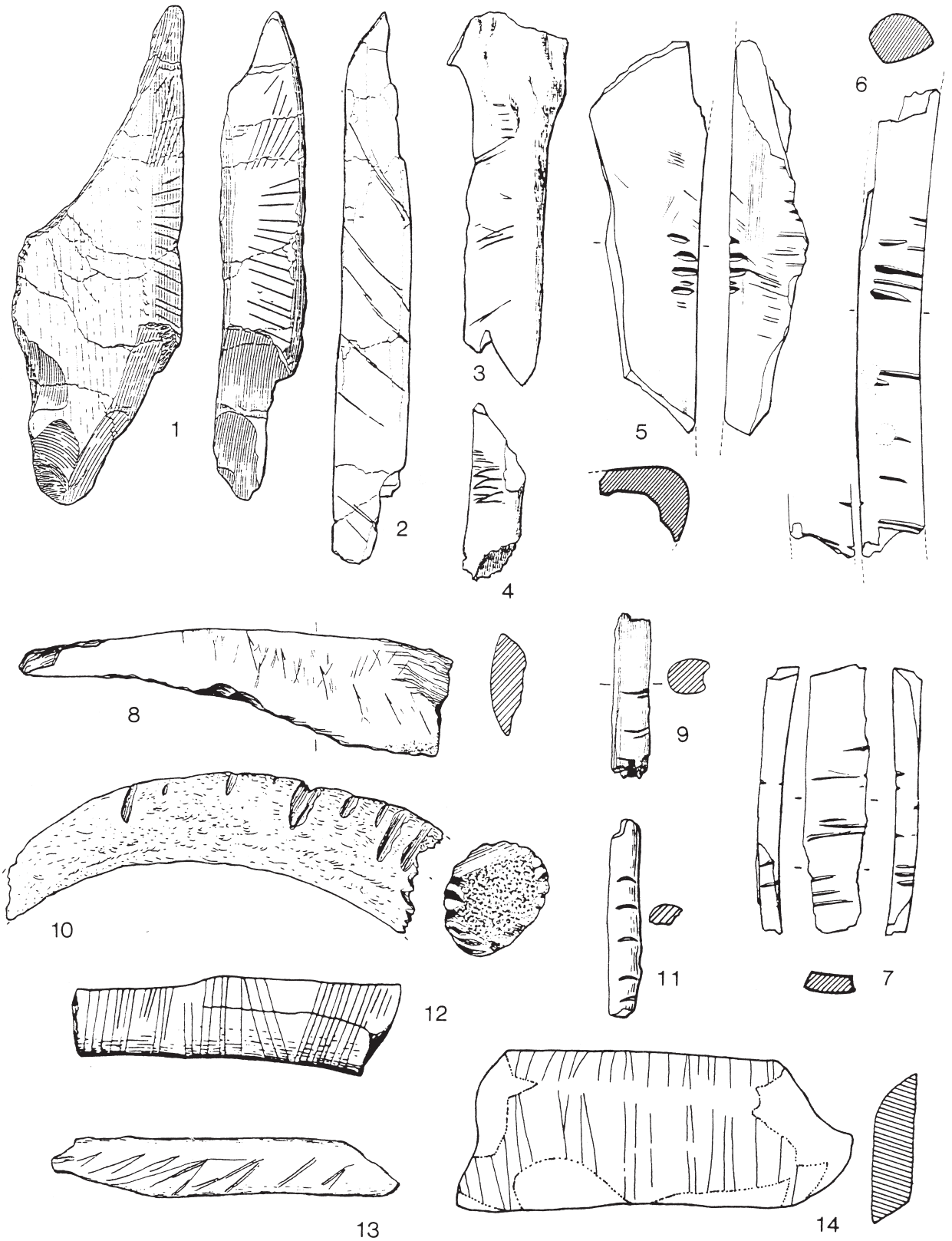


Figure 3.5. *Bone and stone objects from European Lower and Middle Palaeolithic sites described as bearing human-made sets of marks. 1–2: Bilzingsleben; 3–4: Suard; 5–7: Marillac; 8–9: Morin; 10: Vaufrey; 11: Beneito; 12: La Ferrassie; 13: Ermitage; 14: Temnata.*

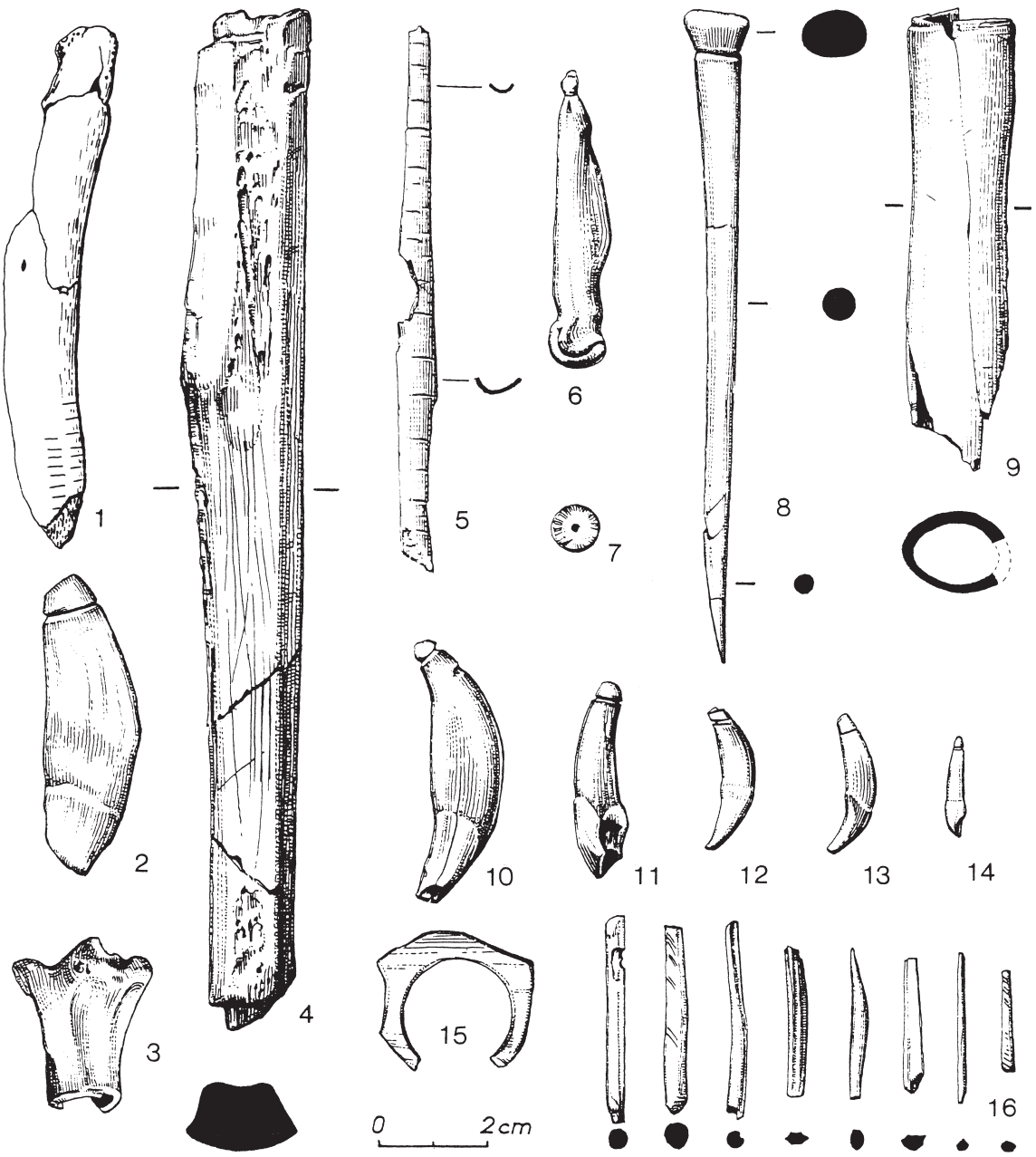


Figure 3.6. *Examples of worked bones and personal ornaments from the Châtelperronian levels of the Grotte du Renne. 1: Proximal end of a rib covered with ochre showing two sequences of regularly spaced notches; 2: hyena canine with grooved root; 3: epiphysis of a swan ulna sectioned by sawing; 4: long bone shaft fragment shaped by scraping; 5: bird bone diaphysis with regularly spaced notches; 6: reindeer metapodial with groove for suspension; 7: fragment of crinoid with natural perforation; 8: bone awl with groove at its base; 9: bone tube sectioned by transversal sawing; 10: wolf canine; 11: bovid incisor; 12–13: fox canines; 14: reindeer incisor; 15: byproduct of ivory ring manufacture; 16: ivory pins with traces of manufacture. (After Leroi-Gourhan & Leroi-Gourhan 1965, with modifications.)*

aspects of the Arcy record indicates that bone tools and personal ornaments discovered in the Châtelperronian levels of the Grotte du Renne do not originate from the overlying Aurignacian level but are, on the contrary, contemporary with the lithic assemblages and the man-made structures of the Châtelperronian levels. Refitting of worked bones and the presence of by-products of bone manufacture reveal that the body ornaments found at the site were made by the Châtelperronians and that they were neither the result of gathering of abandoned objects or trading with the Aurignacians. On the basis of a re-evaluation of the Châtelperronian and Uluzzian material culture, d'Errico *et al.* also argue that, contrary to general opinion, there is no evidence of adoption or absorption of Aurignacian bone and lithic technology by the late Neanderthals, but rather an independent invention of different ways of solving similar technological problems. This result is consistent with the patterns of chronological and geographical distribution of Aurignacian, Châtelperronian, Uluzzian and late Mousterian settlements suggesting that, with the exception of the Iberian peninsula, serious doubt exists regarding the putative prolonged contemporaneity of Neanderthal and anatomically modern human groups in Western Europe. In sum, the hypothesis whereby the Châtelperronian Neanderthals were acculturated by the Aurignacians becomes difficult to support.

If the acculturation hypothesis is rejected, those working on the evolution of human cognitive abilities should look at the cultural achievements of the late Neanderthals in a new light. We should consider the profound implications of the manufacture and use of body ornaments by Neanderthals. Objects created for visual display on a human body necessarily imply a communication of some meaning (Leach 1976). A varied collection of objects such as those found at the Grotte du Renne — objects which were probably used by the same human group — suggests the elaboration of a code in which different categories of pendants convey complex messages by their presence, absence, association or position on the body. In many traditional societies, these codes provide information on the age, gender, social status and ethnic membership of the holder (Strathern & Strathern 1971; Faris 1972; Brain 1979; Hodder 1979; Morris & Preston-Whyte 1994; Strathern, this volume) and their use requires an intimate and often tacit knowledge of the cultural and social system (Hall 1973). We are therefore forced to admit that Châtelperronian Neanderthals elaborated, used and transmitted autonomous codes, as a reflection of possibly different social roles and an expression of a different cultural system. Symbolling, or 'external symbolic storage' (*sensu* Donald 1991), is a necessary prerequisite for developing such codes. The analysis of notched objects from Middle Palaeolithic contexts could even prove these Neanderthals had the ability to elaborate and use artificial memory systems. Serially marked bones from Arcy and other late Middle Palaeolithic sites have not yet been submitted to a technical analysis. It is clear, however, that the varied collection of the Arcy body ornaments constitutes the best data set we have with which to study the emergence of these devices.

This is but one example of the perils involved in looking at the evolution of human cognitive abilities in stadial terms, and in elaborating biologically based models for the evolution of human intelligence. So far, the debate about the origin of symbolic behaviour has been dominated by European evidence, undoubtedly a reflection of a Eurocentric way of looking at the evolution of cognitive abilities. Models of a biologically-based intellectual superiority of anatomically modern humans (Byers 1994; Mithen 1996; Foley 1996), however, fail to explain why the first North African and Near Eastern anatomically modern humans have left so little archaeological evidence of their modern cognitive abilities (see Marshack 1995 for a possible single exception). Contemporary South African moderns, in contrast, used large quantities of pigment, and produced serially notched objects and engraved ostrich eggshells, as demonstrated by early Middle Stone sites (MSA2b) such as Klasies River Mouth and Apollo 11 (Singer & Wymer 1982; Wendt 1974). Knight *et al.* (1995) have argued that the South African record implies a symbolic tradition extending back approximately 100 Kya. As with the late Middle Palaeolithic record, however, technological analysis of the MSA notched objects, demonstrating their possible use as AMSs, has not yet been carried out. Whatever the ultimate result of future research, the evidence from Arcy and from the Near East suggests that the reasons for the emergence of symbolling and the ensuing ability to produce AMSs would be more successfully researched outside the strict biological domain of species replacement, and far away from unilinear models of cognitive development (Gibson 1996). The best explanations are likely to come by focusing on the particular social, cultural and palaeoenvironmental contexts in which different types of AMSs were independently conceived and used. In the next section I will examine the record of one of these possible contexts, that of the European Upper Palaeolithic.

The European Upper Palaeolithic record

I present here the analysis of five serially marked objects from France: two ribs from the Aurignacian layers of the Abri Blanchard, Dordogne (Didon 1911); a fragment of reindeer metapodial, probably Gravettian, from the Abri Labattut, Dordogne (Sonneville-Bordes 1960); a rhinoceros rib from the site of Solutré, Saône-et-Loire (Combier 1976); and a spatula made from a rib from the Magdalenian layers of the Laugerie-Basse shelter, Dordogne (Peyrony & Maury 1914). With the exception of the Solutré rib, kept in the Musée de Solutré, the other specimens are stored in the Laboratoire de Préhistoire of the Musée de l'Homme. Discussion of these results will take into account already published analyses (d'Errico & Cacho 1994; d'Errico 1995b) and studies in progress.

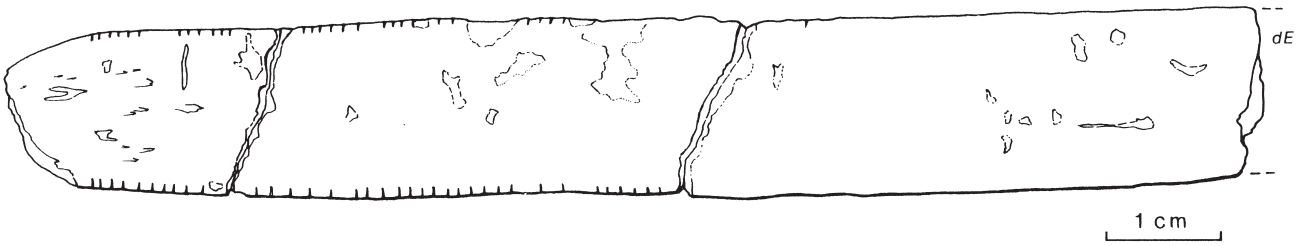


Figure 3.7. *Notched rib from the Abri Blanchard (cat. no. D.38.23.1958)*

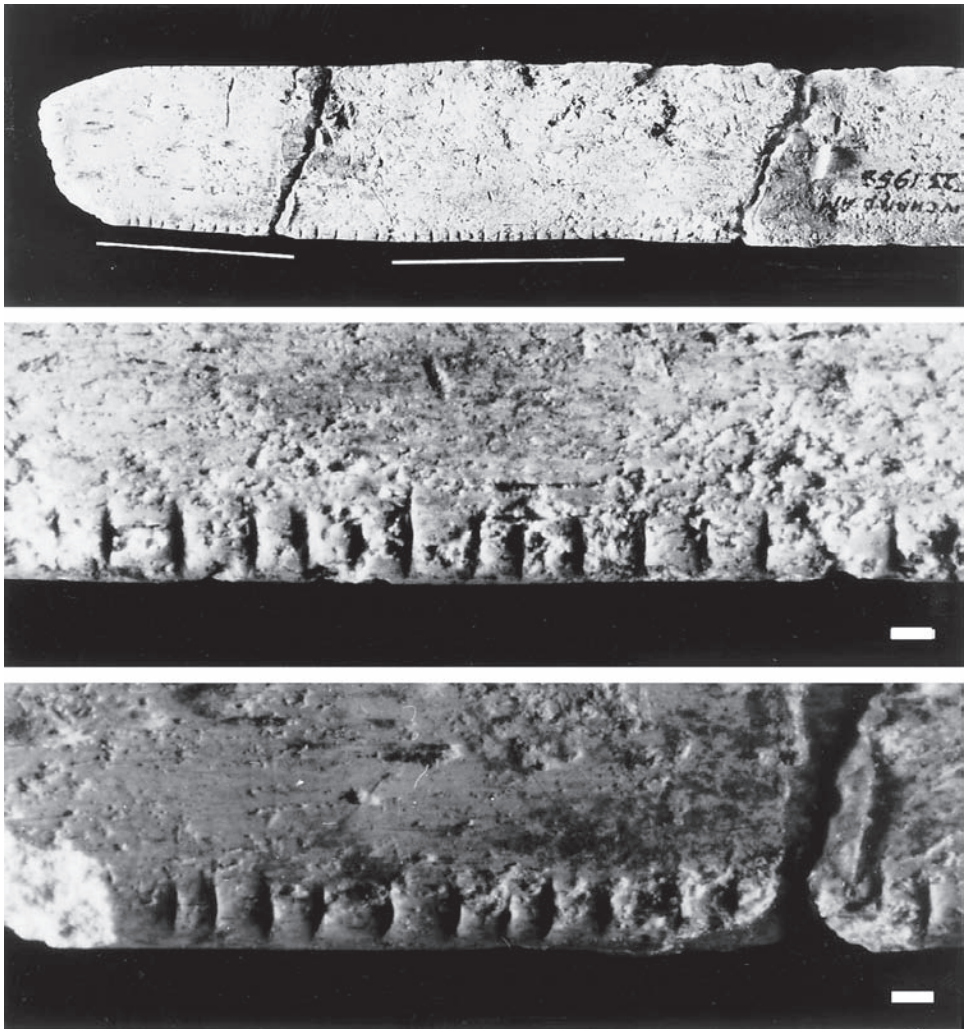


Figure 3.8. *Close-up view (top) of the notched area of rib D.38.23.1958 showing different types of post-depositional damage. White lines indicate the area enlarged in the centre (right) and at the bottom (left). Scales = 1 mm.*

Blanchard

The first rib from Blanchard (D.38.23.1958) was marked on both edges with two sequences of regularly spaced tiny incisions (Fig. 3.7). These can be estimated at 44 on one edge and 38 on the other, though the original number is difficult to establish because of post-depositional damage to the edges and fractures at both ends of the object. Experimental reproduction of these marks indicates that they were produced by a single passage of an unretouched cutting edge (Fig. 3.8). The state of preservation of the object does not allow the making of silicone replicas for SEM analysis of the marks. Moreover, the marking procedure and the dimension of the marks make the analysis of the profiles an ineffective technique to identify changes of tool. Optical examination of the incisions, however, suggests that all the marks on one side, and probably those on both sides were produced in one session by the same tool. These incisions are too tiny to be effective in helping the hafting or the prehension of the object during its use. They are hardly visible when you look at the object as a whole, but easy to distinguish if you focus on each individual incision. Since no morphological differences are visible between the marks, and they were probably carved in just one session, this object could represent an AMS with a code based exclusively on the spatial distribution of the elements. Since technological analysis is incomplete, however, we cannot exclude the possibility that the engraved pattern, though a form of external symbolic storage, could respond to other communication needs.

The second rib (D.38.23.1858) shows two sets of notches, one carved on the external curved aspect of the rib, the other on its caudal edge (Figs. 3.9–3.10). A space, deliberately kept free of marks, was left in the first set, between the first two notches and the others. A single unretouched cutting edge was used to carve each set, as demonstrated by the morphology of notches and, for notches carved on the edge, by their profiles (Fig. 3.11). The regular, slightly oblique orientation of the notches on the edge of the rib suggests that all the marks were produced in just one session without interruption of the hand motion. The morphological difference between the first three notches on the left and the others is due to the fact that the former were carved more superficially, and that they were probably made first, as suggested by the gradual opening of the angle formed by the notch walls and by the rounded morphology of the bottom of the first notches (Fig. 3.12).

We could interpret this pattern as an AMS with a code based on the morphology of the elements and their spatial distribution. Other functions for these marks, however, can also be proposed; for instance, traces indicating the use of the object as a '*retouchoir*' (a knapping tool to retouch flint blanks), are present near its broken end and between the notches of the first set. In addition, the unbroken end reveals evidence of wear, probably produced by the use of the object as a punch for knapping blades by indirect percussion. Experimental reproduction of this knapping technique reveals that the craftman's hand is generally positioned near the zone of the punch in contact with the core, to determine precisely the percussion point. This suggests that the two sets of marks had a functional purpose, that of helping the prehension of the object during its use.

Labattut

The dorsal crest of the reindeer metapodial from Labattut was marked with at least 65 notches, certainly more before the fracture of the bone (Fig. 3.13). Morphological analysis of the notches indicates that they were produced by three, or possibly four different unretouched cutting edges (Figs. 3.14–3.16). The identification of changes of tool is confirmed by quantitative analysis of the notch angles, which vary in coincidence with the changes of tool. The breakdown between the sets A–B is also marked by a slight change in the orientation of the marks. More importantly, this change is marked by a clear reduction in the spacing between marks, suggesting that the engraver moved the marks closer together when less space became available. Apparently he or she was not interested in producing a regular pattern, but rather in placing a certain number of marks on the bone. We note that:

a) changes of tool were not due to the fact that the tool itself became too worn and needed replacement since the last notches of each set do not show breakage or particularly intensive wear;
b) changes of tool were not due to the desire to produce a more complex pattern, since changes in notch morphology are not visible to the naked eye;
c) there is no evidence that the notches had a utilitarian function, nor that the object was used as a personal ornament.

If changes of tool are the result of lapses of time occurring between sets of marks, then we are dealing with an AMS having a code based exclusively on the accumulation of elements through time. We know that from 3 to 36 isomorphic elements bearing the same information were recorded in a single session. Recovery of information was probably carried

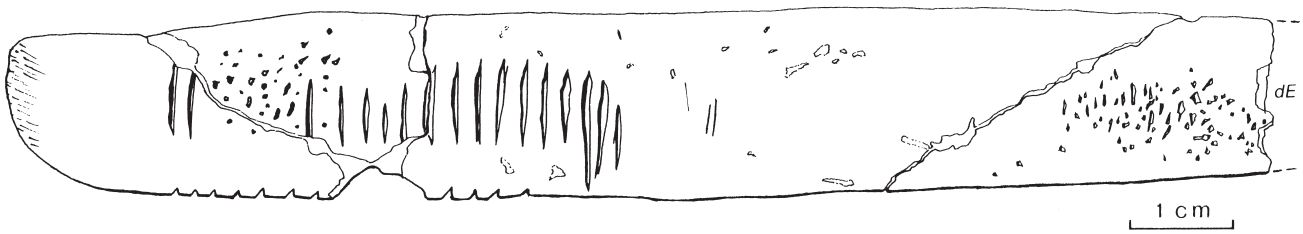


Figure 3.9. *Notched rib from the Abri Blanchard (cat. no. D.38.23.1858)*

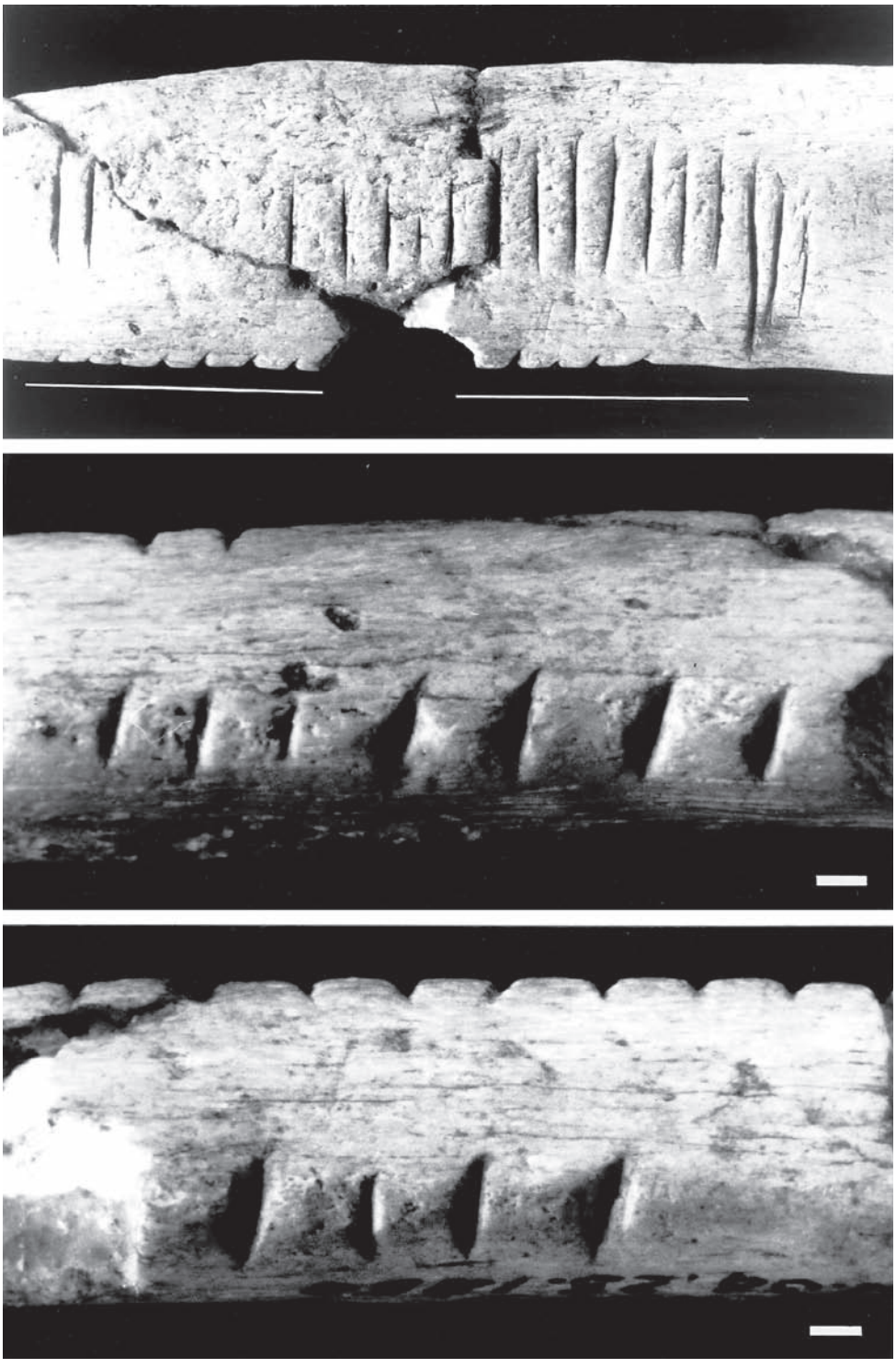


Figure 3.10. *Close-up view (top) of the notched area of the rib D.38.23.1858 showing two sets of notches. White lines indicate the area enlarged in the centre (left) and at the bottom (right). Scale = 1 mm.*

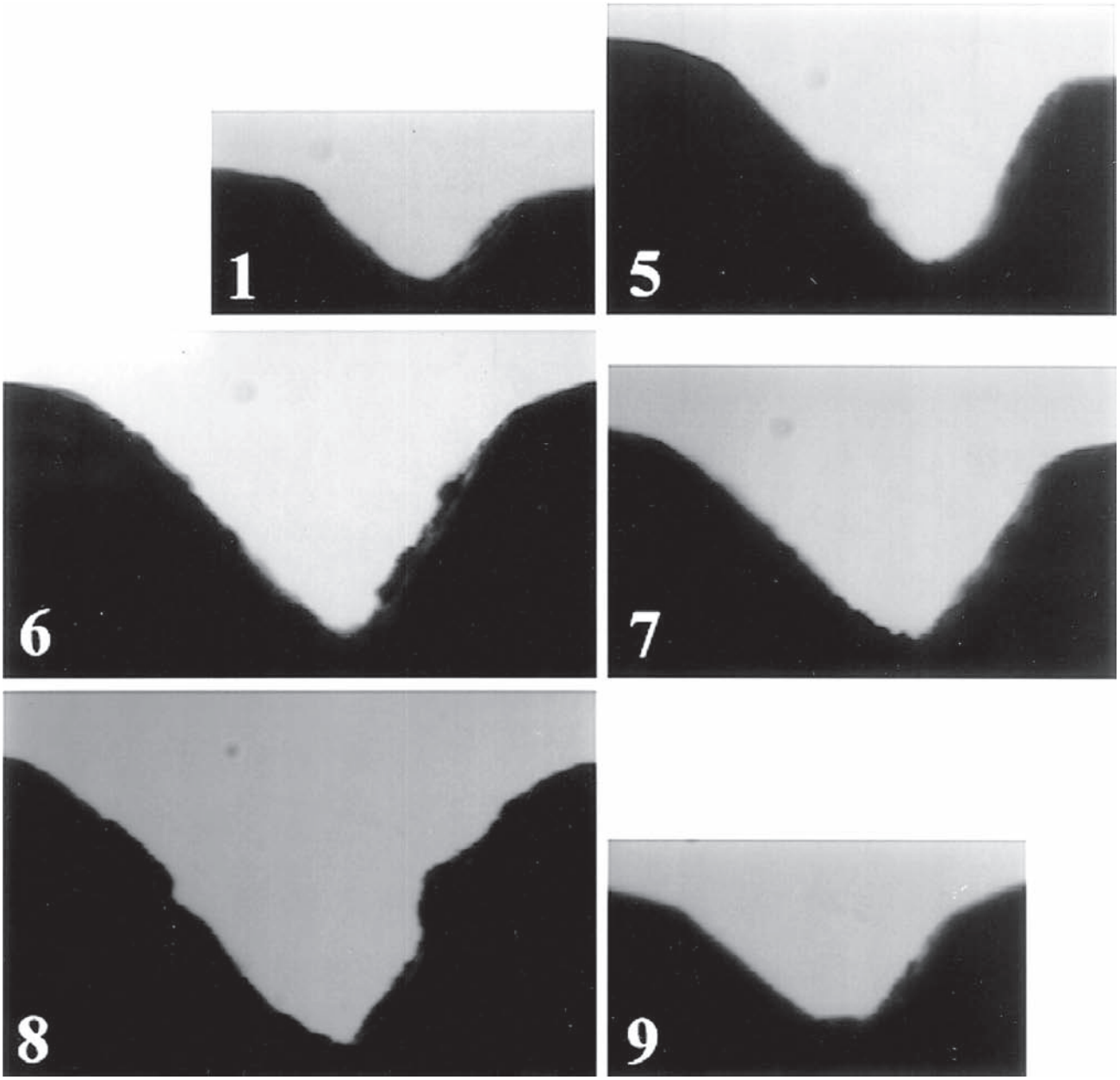


Figure 3.11. *Profiles of notches carved on the caudal edge of the Blanchard rib. Notice the constant asymmetric morphology of the profiles suggesting the use of the same tool. Protuberances on the left side of notch 5, on the right sides of notches 6 and 8, and at bottom of notch 9 are due to microconcretions present inside these marks.*

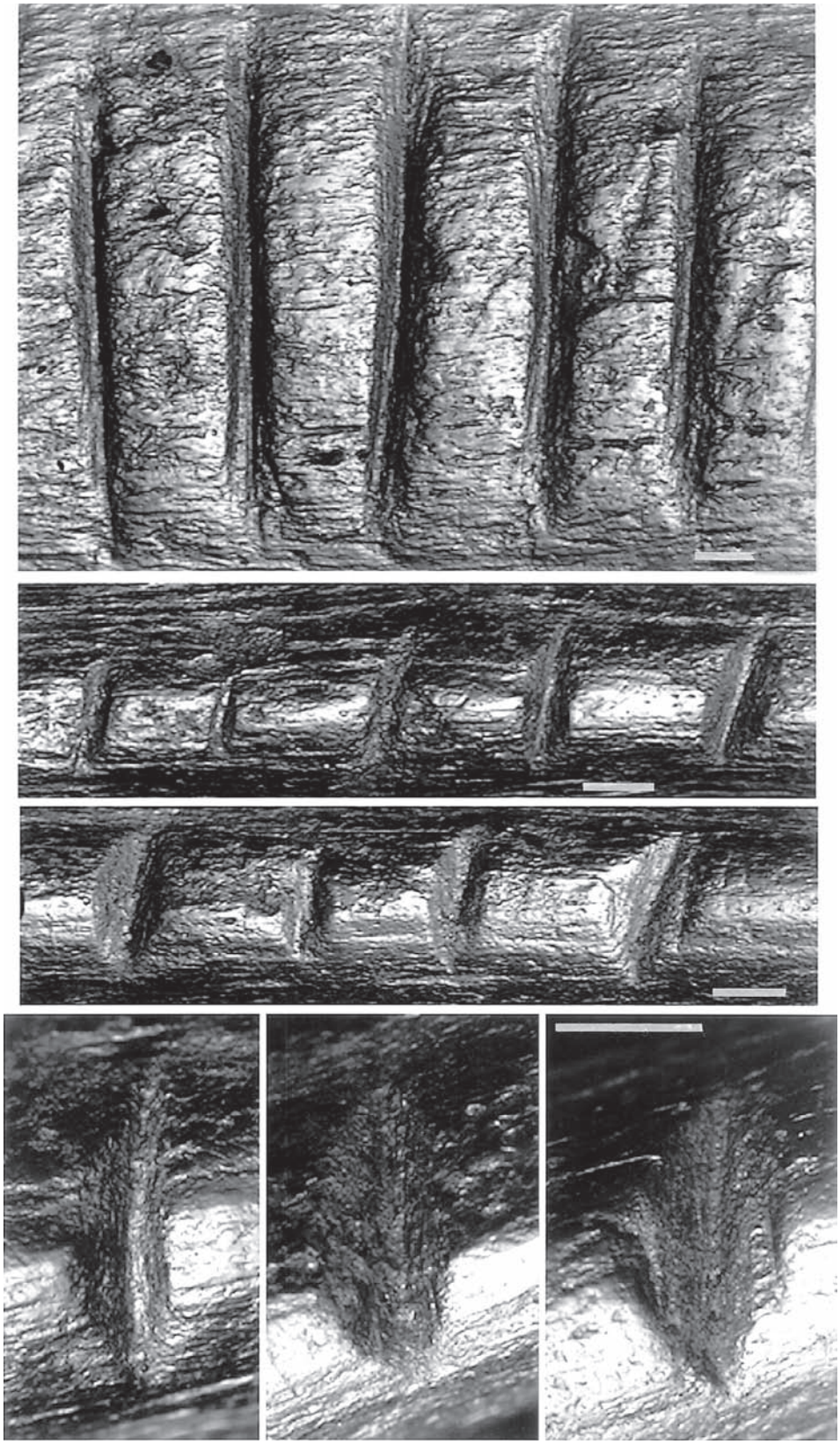


Figure 3.12. *Top: notches engraved on the external aspect of the Blanchard rib; centre: notches engraved on the edge; bottom: close-up view of notches 5, 8 and 11. Scale= 1 mm.*

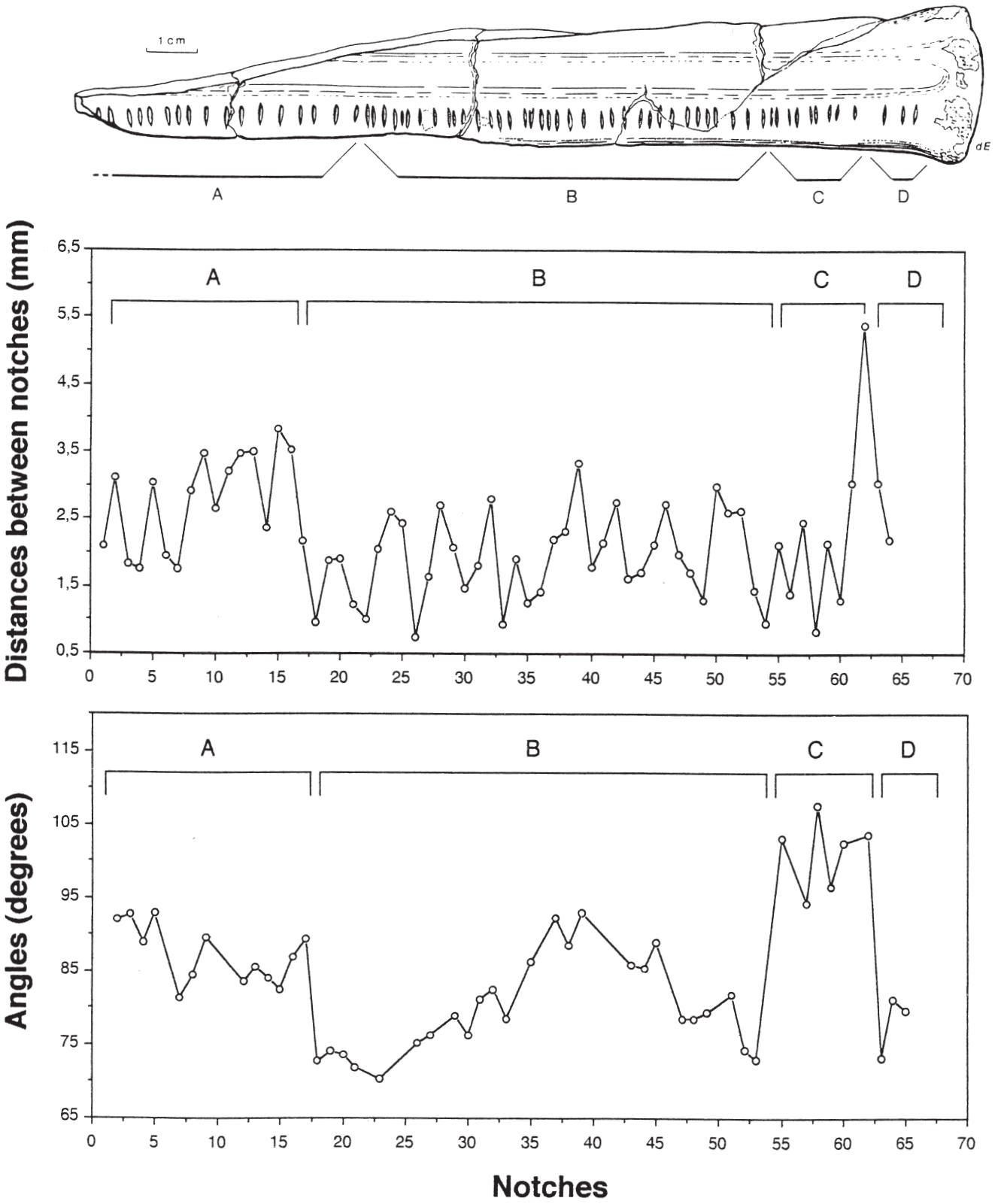


Figure 3.13. *Top: line rendition of the fragmentary reindeer metapodial from the Abri Labattut (cat. num. D.38.23.2072) indicating the four sets carved by different cutting edges; centre: variation in the spacing between notches; bottom: variation of the angles formed by the notch walls.*

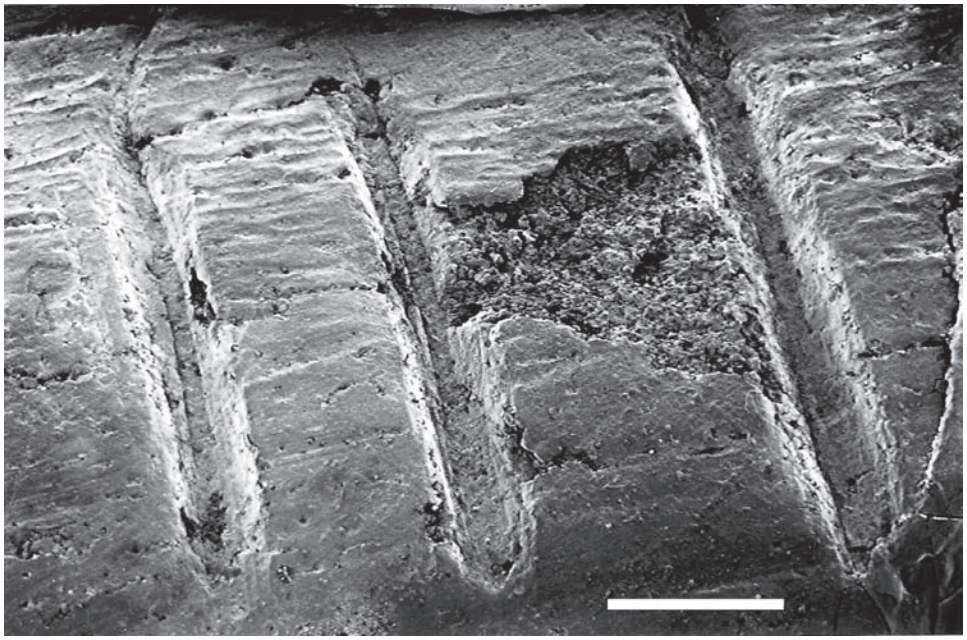


Figure 3.14. *SEM micrograph of notches B12–14. Use of the same tool can be recognized by observing the general shape of the marks and, in particular, their flat bottom. Scale = 1 mm.*

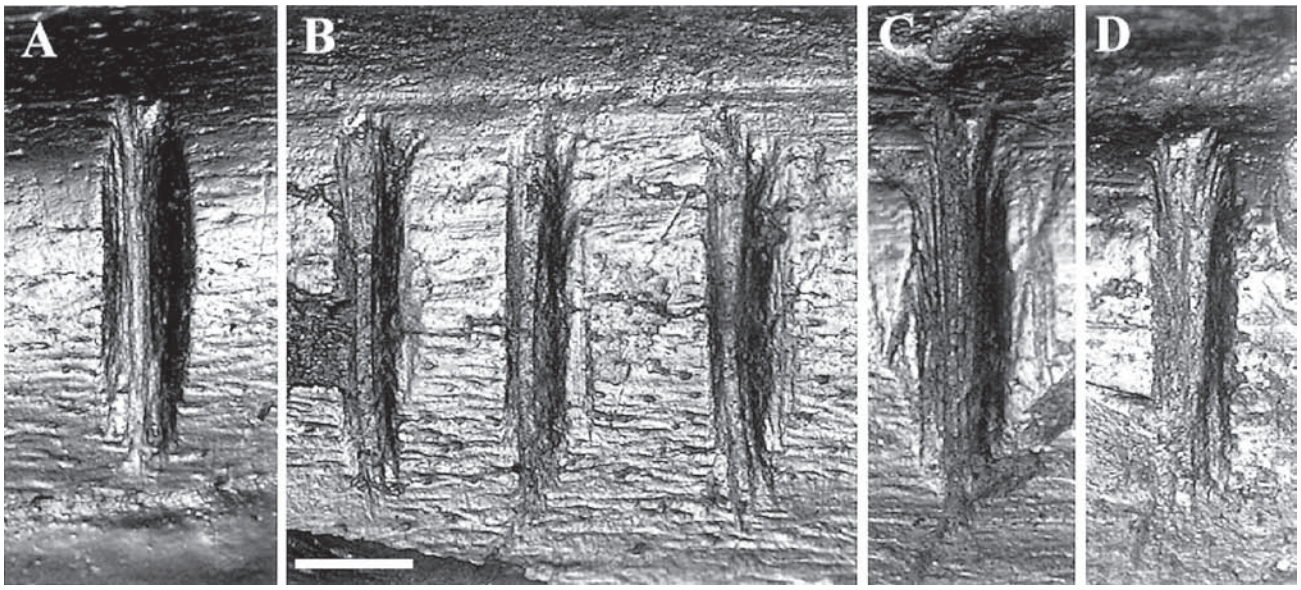


Figure 3.15. *Notches carved on the crest of the Labattut metapodial: A: A13; B: B12–14; C: C4; D: D1. Scale = 1 mm.*

out by combining visual and tactual reception, but could also be obtained by tactile perception alone, for example by moving the finger-tip along the bone. If the notches were carved only on the anterior face of the metapodial, the chosen support did not allow the recording of more than 80 pieces of information.

Solutré

Similar results were obtained by studying the rhinoceros rib from Solutré (Fig. 3.17). The concave face of the rib is engraved with hundreds of thin single-stroke lines, close to each other and perpendicular to the main axis of the bone. A large number, if not all, were engraved in one session by a single point. These thin lines are crossed by a few more recent and wider long lines, made by another point. The convex face of the rib is engraved with a few groups of single-stroke lines, each made with a single point, crossed by several groups of irregular long lines.

The most striking feature of this object results

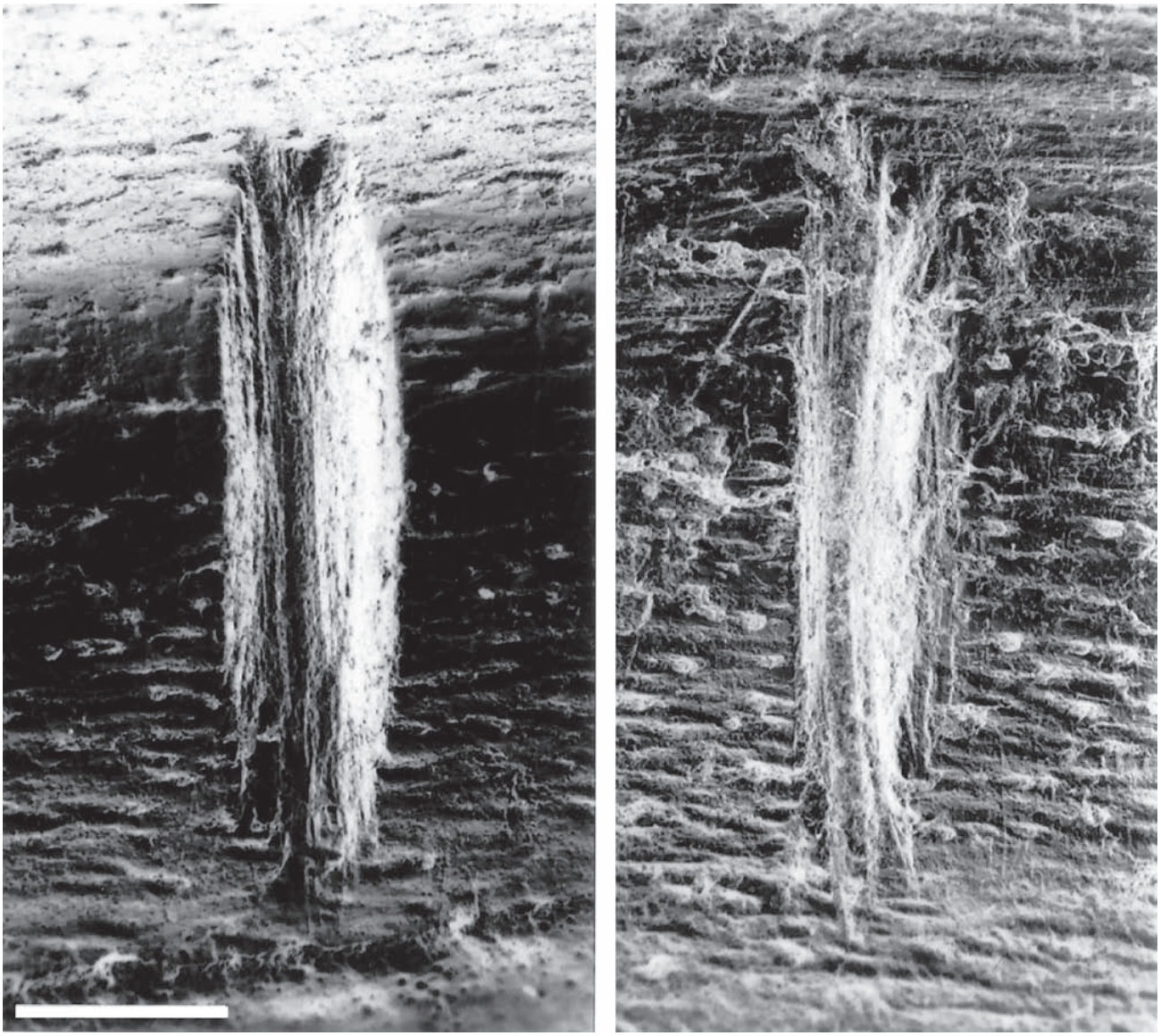


Figure 3.16. *Close-up view of notches A13 (left) and B14 (right) of the Labattut metapodial demonstrating morphological difference between the two notches produced by two different cutting edges. Resin replicas photographed in transmitted light and printed as negative. Scale = 1 mm.*

from the 53 notches carved on one side of the piece. Microscopic analysis of the notches and study of their profiles (the latter using two different methods) indicate that the notches were produced by unretouched cutting edges, and that a dozen changes of cutting edge took place in the course of the accumulation of the marks (Figs. 3.18–3.19).

If the change of cutting edge corresponds to lapses of time, we are once again faced with an artificial memory system with a code based on the accumulation of elements through time.

Use of this object over a long period is suggested by the differential wear of the notch edges. Experimental notches and well-preserved archaeological notches generally show clean edges. At Solutré, on the contrary, the edges of the notches are heavily smoothed. The bone surface near the notches is very similar, at microscopic scale, to that reproduced experimentally by manipulating bone objects (Bromage 1984; d'Errico 1993), i.e. a highly homogeneous appearance with striations 1–2 μm wide. That these features are the result of technical

or post-depositional processes cannot be formally excluded. They are, however, quite different from those produced by experimentally polishing the bone surface with skins and furs or by mimicking several types of postdepositional process such as movement in the soil with water, sand, gravel, flint or bone fragments (Shipman & Rose 1988; d'Errico 1993). These processes produce much larger striations and, in some cases, different types of impact, absent at Solutré.

Another element confirming a prolonged use of the object is the intensive wear of its point (Fig. 3.20). The wear consists of small impacts as well as a number of randomly oriented striations of different lengths, thereby suggesting a local, repeated abrasion compatible with that described on the active zone of digging-sticks (Oakley *et al.* 1977). Finally, some zones of the edge show traces of heavy scraping which has exposed the spongy bone. The wavy morphology of the scraped area suggests that, by comparison with experimental reproduction of the same feature, the scraping might have erased pre-existing notches. All these are clues suggesting that changes of tool correspond to an accumulation over time.

In the Solutré rib, between 1 and 10 isomorphic elements bearing the same information were recorded at each session. As with the Labattut metapodial, the marking technique and the space available limit the possible number of stored signs to around 100, or to around 200 if notches are carved on both sides of the rib. The dimension of the rhinoceros rib and the number of notches carved on its edge make it difficult to look at all of them or to count them only visually. Recovery of information was probably carried out by combining visual and tactile perception, or even by tactile perception alone.

Laugerie Basse

The spatula from Laugerie Basse probably bears an AMS of a different type (Figs. 3.21–3.22). This object was produced by extracting an elongated bone blade from a rib using the groove and splinter technique. The final shape was given by carefully scraping and polishing the piece. The main, slightly concave, face (A) is engraved with three parallel rows of incisions to the left. To the right, one edge is marked with five sets of notches. The other edge of the same face shows a set of 7–8 notches which were deliberately erased by scraping and are now barely visible because of the ink which covers this area. The other face shows eight sets of incisions, two of which have also been deliberately erased. Each of the parallel rows of incisions (A–C) on face A was engraved by a single tool and it is possible that a change of tool took place between these three rows. Experimental reproduction of these marks indicates that the object was probably turned 180° between the two external rows, in order to facilitate the marking procedure. This can result in morphological variations which are difficult to distinguish from changes of tool. The eight sets of face B show a similar pattern. Sets J–L were probably engraved by the same tool. Changes of tool occurred between these two sets and set M, as well as between these and set N. Clear morphological differences and changes in the orientation of the marks exist between the five sets (D–H) engraved on face A. The question, however, is whether these differences are the consequence of repeated changes of tool, or the result of an intentional procedure. Experimental reproduction of these marks suggests that it is difficult to produce consecutively such pronounced morphological differences between sets only by changing tool. Furthermore, a closer analysis of the marks (Fig. 3.23) reveals that the same tool was used for tracing marks belonging to different sets. It is probable that these five sets were produced in just one session and that the engraver deliberately enhanced the differences between sets, and tried to keep the morphology of marks within each set stable.

It is hard to say what exactly the code-type of this AMS is because the rules seem to change in each part of the object. Sets A–C could be the expression of a code based on spatial distribution and, perhaps, on accumulation over time. Sets D–H, on the contrary, seem the expression of a code based on the morphology of the elements. Sets J–R, on the other face, could be the result of an accumulation over time. The repeated erasure of marks suggests that information was updated over time, but not necessarily that the code was based on accumulation over time, since in codes of this type updating is to be expected and there is no need to erase marks.

La Marche

My new study of the La Marche antler (1995b), a well-known object studied previously by Alexander Marshack, has provided a new interpretation of this piece (Fig. 3.24). According to Marshack (1972c; 1996), each set of marks was engraved by different points, showing an accumulation over time. On the basis of these putative changes of tool and on the counting of the incisions, the object was interpreted as a lunar calendar. I have shown that, for the large majority of the sets, the accumulation hypothesis cannot be retained: many morphological changes, interpreted

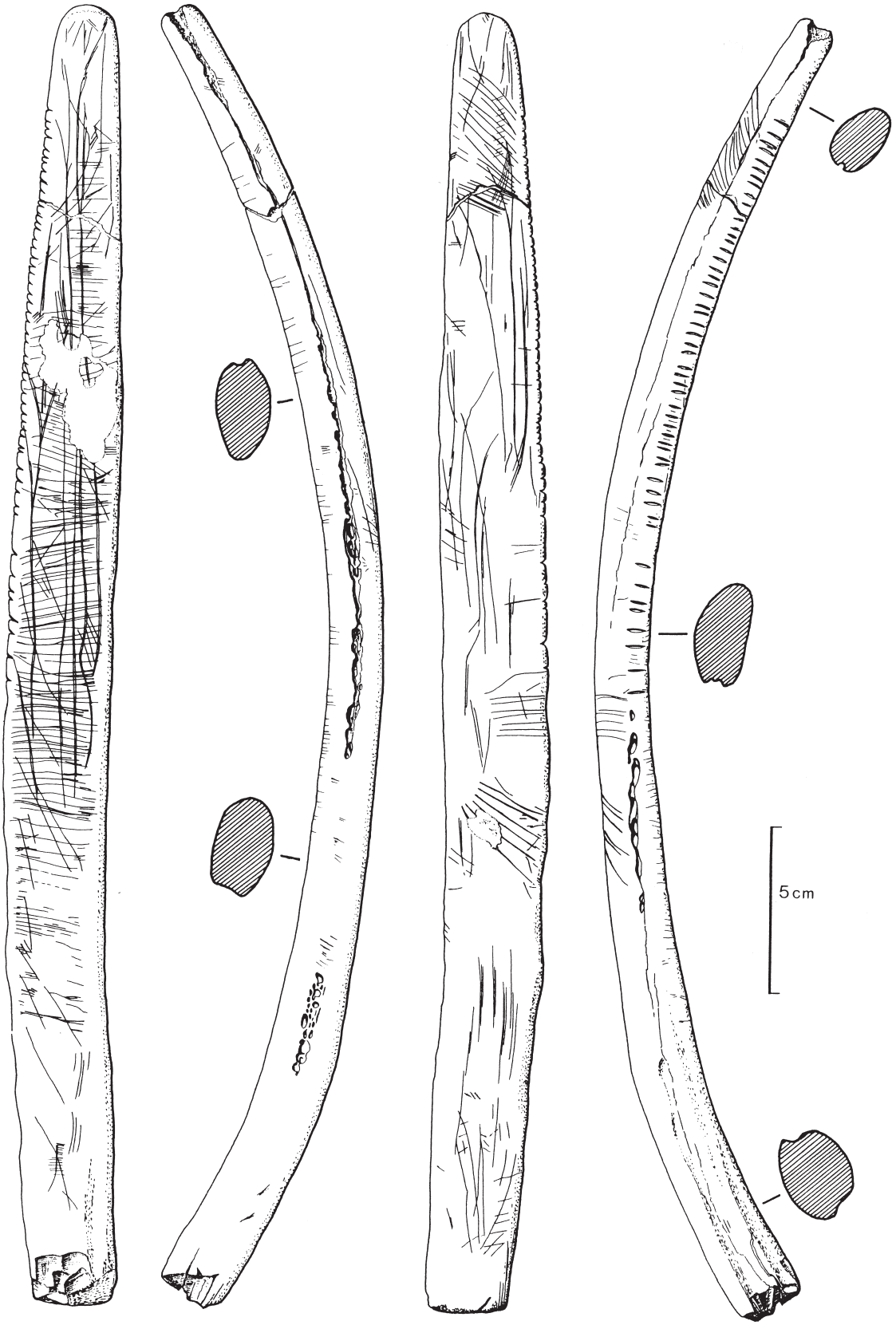


Figure 3.17. *Rhinoceros rib from Solutré.*

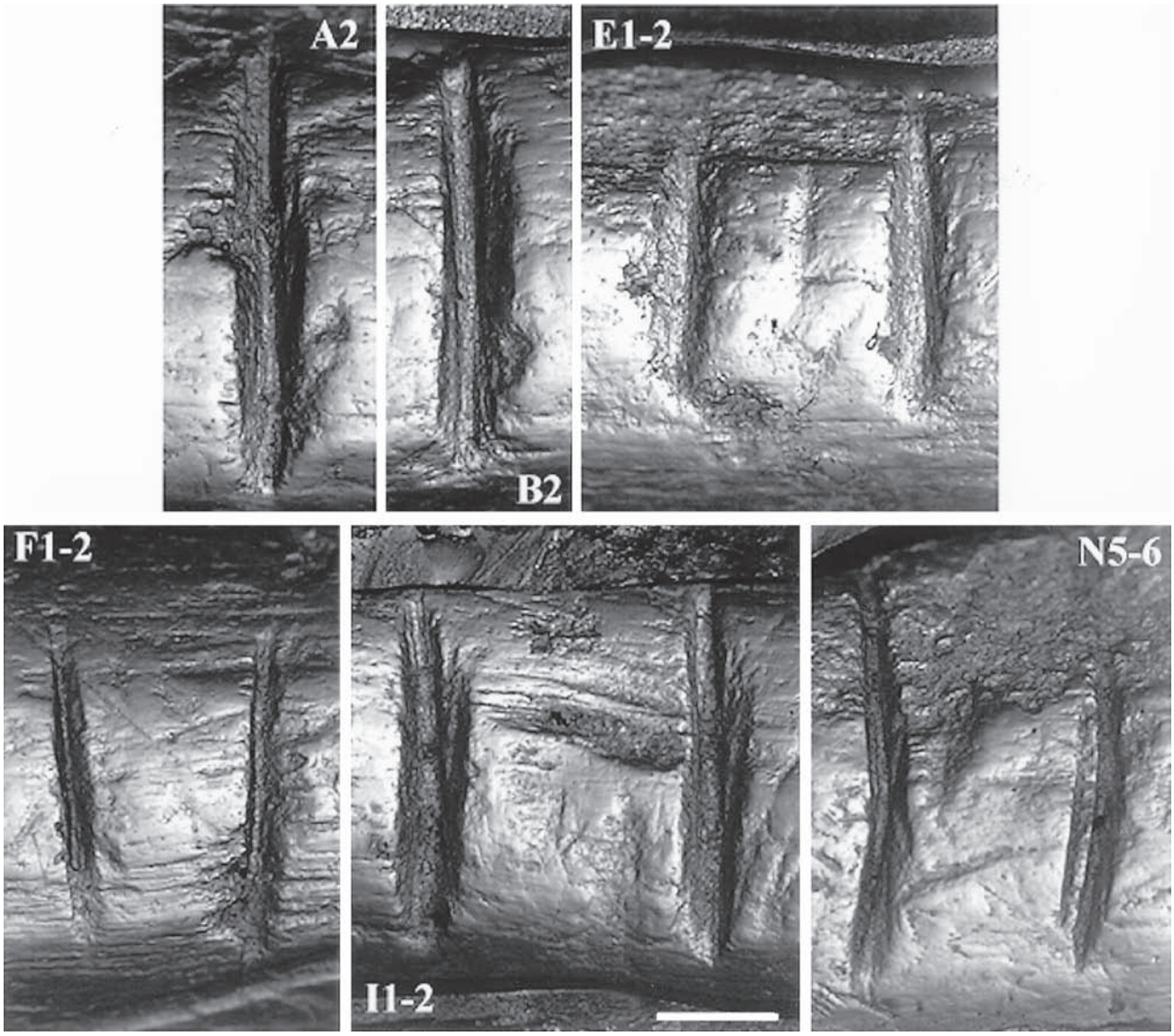


Figure 3.18. *Morphological differences between notches carved on the rib from Solutré suggesting use of different tools. Scale = 1 mm.*

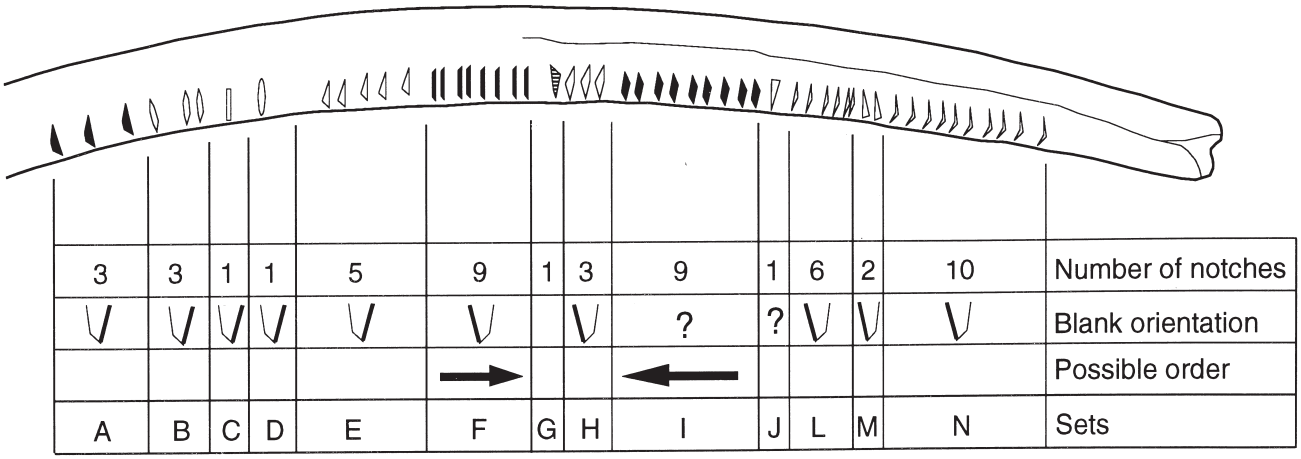


Figure 3.19. *Schematic rendition of the notched side of the Solutré rib. Sets engraved by different tools are indicated.*

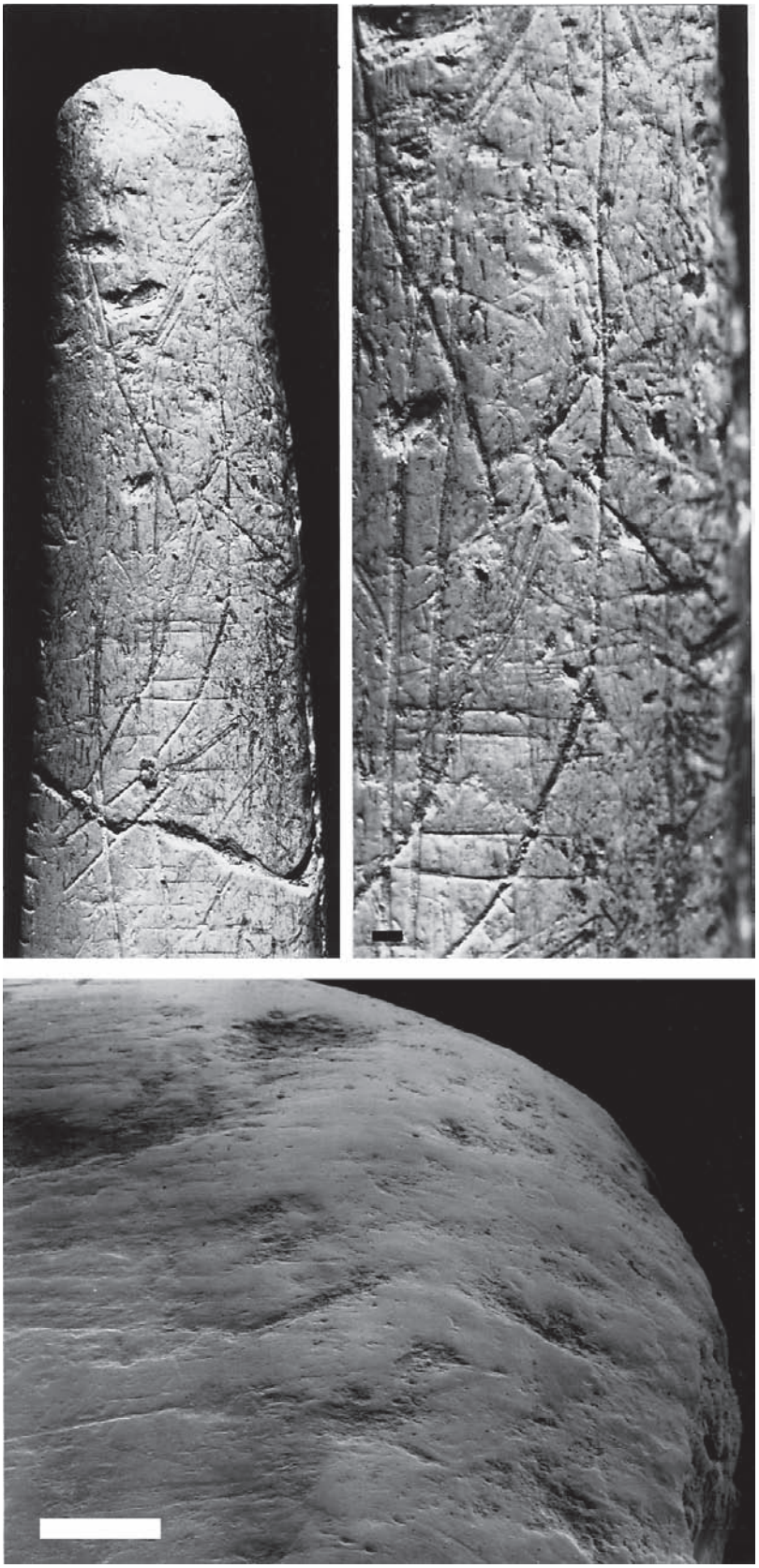


Figure 3.20. *Top left: distal end of the Solutré rib. Top right: detail of the surface showing an entanglement of striations and traces of impacts gradually increasing in number towards the point. Bottom: SEM micrograph of the rib point showing highly abraded appearance. Scale = 1 mm.*

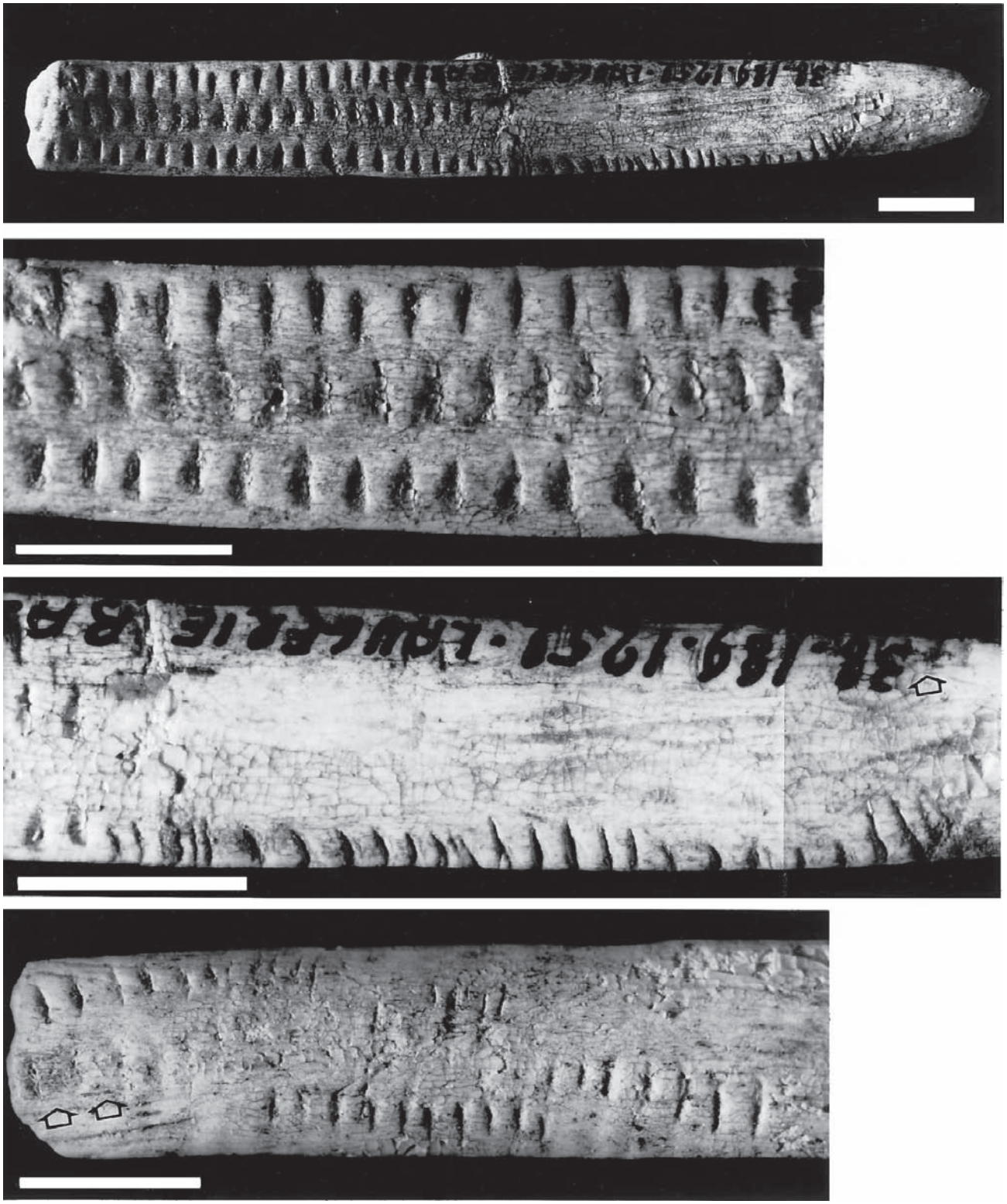


Figure 3.21. *Top: face A of the engraved spatula from Laugerie Basse (cat. no. 38.189.1252); centre: close-up view of the same face; bottom: detail of the opposite face (B). The object was consolidated with a product which has now decayed, producing a microflaking of the surface. For this reason the technical analysis of the marks has been limited to the use of an optical microscope. Arrows indicate the position of sets of marks which have been deliberately erased. Scale = 1 cm.*

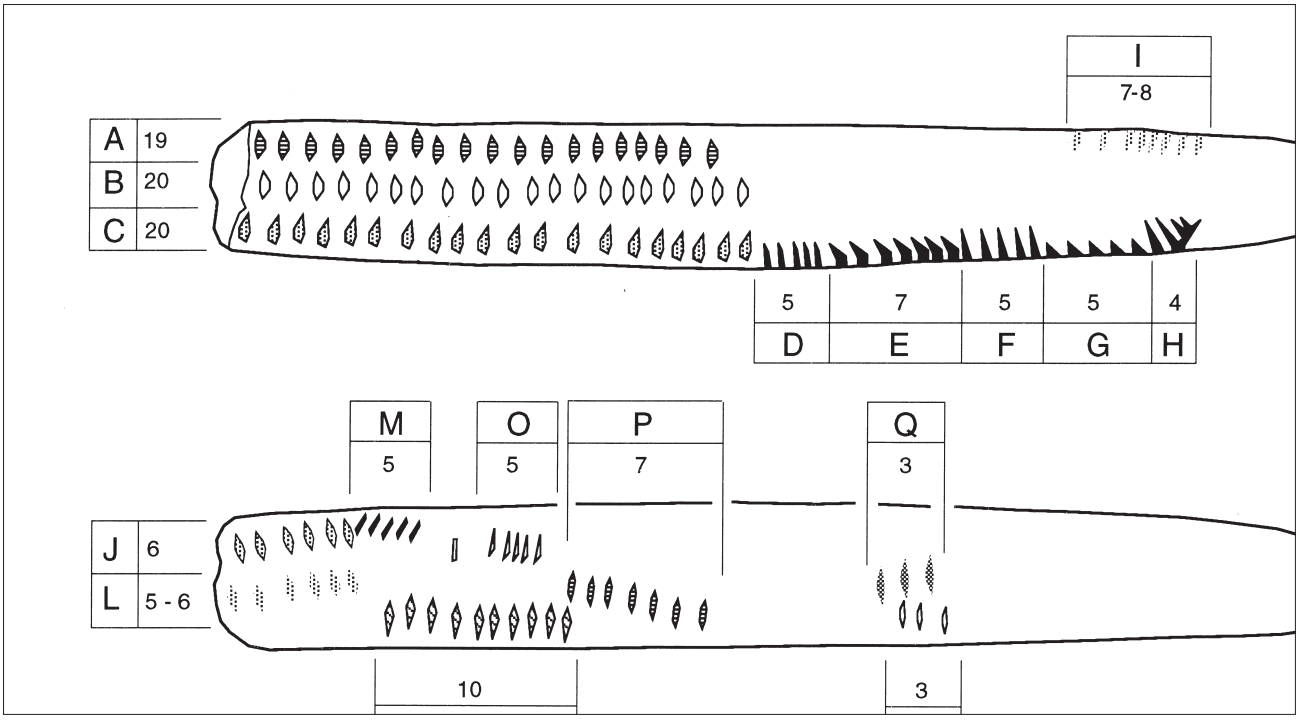
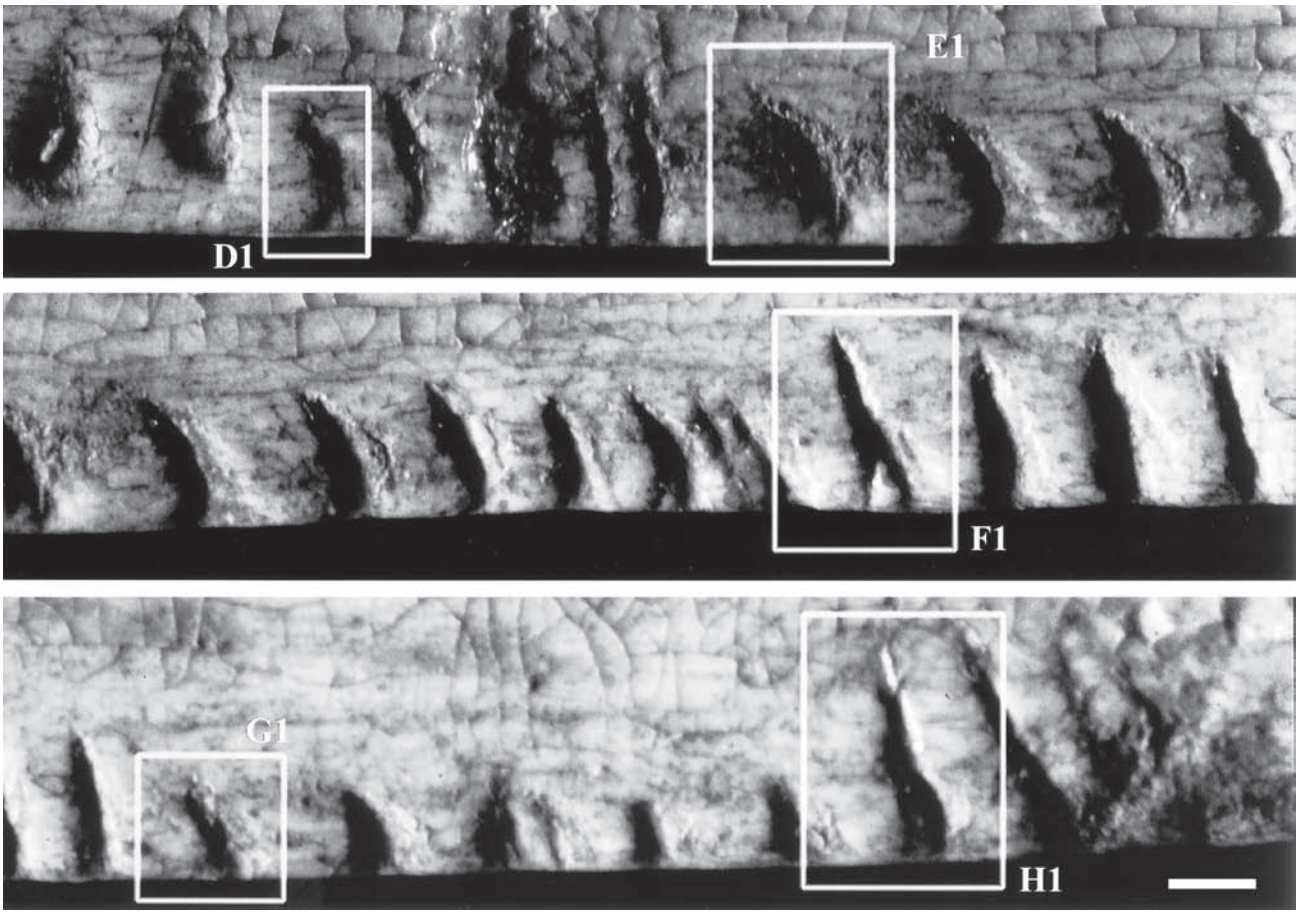


Figure 3.22. *Schematic rendition of the spatula from Laugerie Basse indicating the different sets of marks engraved on this object.*



as being due to changes of tool, correspond to turning the antler upside down within groups of marks produced by the same point. I have also shown that the same point was used to engrave sets of marks on both faces. In two cases, two points were used alternately (set D and G, E and H). My analysis shows that the engraver, in effect, aimed to produce the largest number of morphological differences between the sets while using a small number of tools. In order to achieve this, he changed the orientation of the support, the technique used and the hand motion. Since accumulation through time does not seem to play any role, we must conclude that the La Marche antler code was based on the morphology of the elements and on their spatial distribution. The disposition of morphologically similar marks on several lines also suggests that one or both of these factors were probably hierarchically organized within the code, as we have observed in the quipu. Two horses are also engraved on the La Marche antler. Though they are difficult to assess, it becomes clear, by observing their spatial relationship to the markings, that these depictions played some role in the AMS code. This suggests that in the Upper Palaeolithic, as in modern times, systems of signs can integrate both iconic or symbolic elements.

Tossal de la Roca

The last example I will present is a broken pendant from the late Palaeolithic levels of Tossal de la Roca, a rock-shelter near Alicante, Spain (d'Errico & Cacho 1994). On each side of this object we find four sets of short incisions arranged in parallel rows. Microscopic and morphometric analysis of the marks shows that each set of incisions was made by a different tool and often by a different marking technique (8 or 9 changes in all). In one set (A4) it is even probable that two different points were used. Changes of tool cannot be due to the accidental fracture of the point at the end of each set, since experimental reproduction of these marks demonstrates that it would have been easy to engrave all the pattern with one or two tools. Use of the same point and the same technique would have given a greater homogeneity to the overall design. On the contrary, the use of several tools, different techniques and direction of movement offers an impression of disorder. Certain sets have incisions perpendicular to the axis of the object, while others are oblique. The length of the incisions, as well as their spacing, varies with each set.

This object could, therefore, be an example of an AMS with a code based on spatial distribution of the elements and probably on their morphology. If the change of tool and of technique is taken as an index of lapses of time we might have a code based on all three factors: morphology, time, and distribution of the signs. Because of the small size of the marks and their dense spatial arrangement, recovery of information is only possible, in both the La Marche antler and in the Tossal de la Roca pendant, through visual perception.

Figure 3.23. *(Left) Close-up view, from top to bottom, of sets D–H on face A of the spatula from Laugerie Basse. In spite of clear morphological differences between the groups of marks, the use of the same tool is recognizable. Notice the similarity between the mark D1 and marks of sets E and G (E1 and G1 in particular), and the similar shape of marks F1 and H1. Scale = 1 mm.*

Conclusion

Artificial memory systems were developed and used in Europe at least from the beginning of the Upper Palaeolithic, perhaps earlier in other parts of the world. It is premature to elaborate a reliable scenario for the evolution of these devices. Only a limited sample of objects has been analyzed reliably and few pieces have been studied exhaustively. More importantly, analytical and theoretical tools are not able, and probably never will be able, to provide clear-cut answers in all cases. The second of the serially marked ribs from Blanchard (D.38.23.1858) is an example of an object for which the interpretation as an AMS should probably be dismissed, given the presence of features indicating a possible functional use of the notches. For the first rib from the same site (D.38.23.1958), its interpretation as an AMS represents just one of several possible explanations. The other pieces examined here (Labattut, Solutré, Laugerie Basse, La Marche, Tossal) should more reasonably be interpreted as AMSs, rather than objects used for other purposes. This is suggested by the recorded changes of tool. In other words, we will be able to identify relatively easily only those AMSs with codes based on accumulation over time, and those where the arrangement of the marks and/or morphological changes between marks are difficult to explain otherwise. It seems, however, that a number of Palaeolithic AMSs will be difficult to identify as such and that we will always have limited information, and a biased view, of their use and possible evolution. The ambiguity of the archaeological record stems probably from the particular polysemic approach that humans adopt when conveying meaning through material representations. If

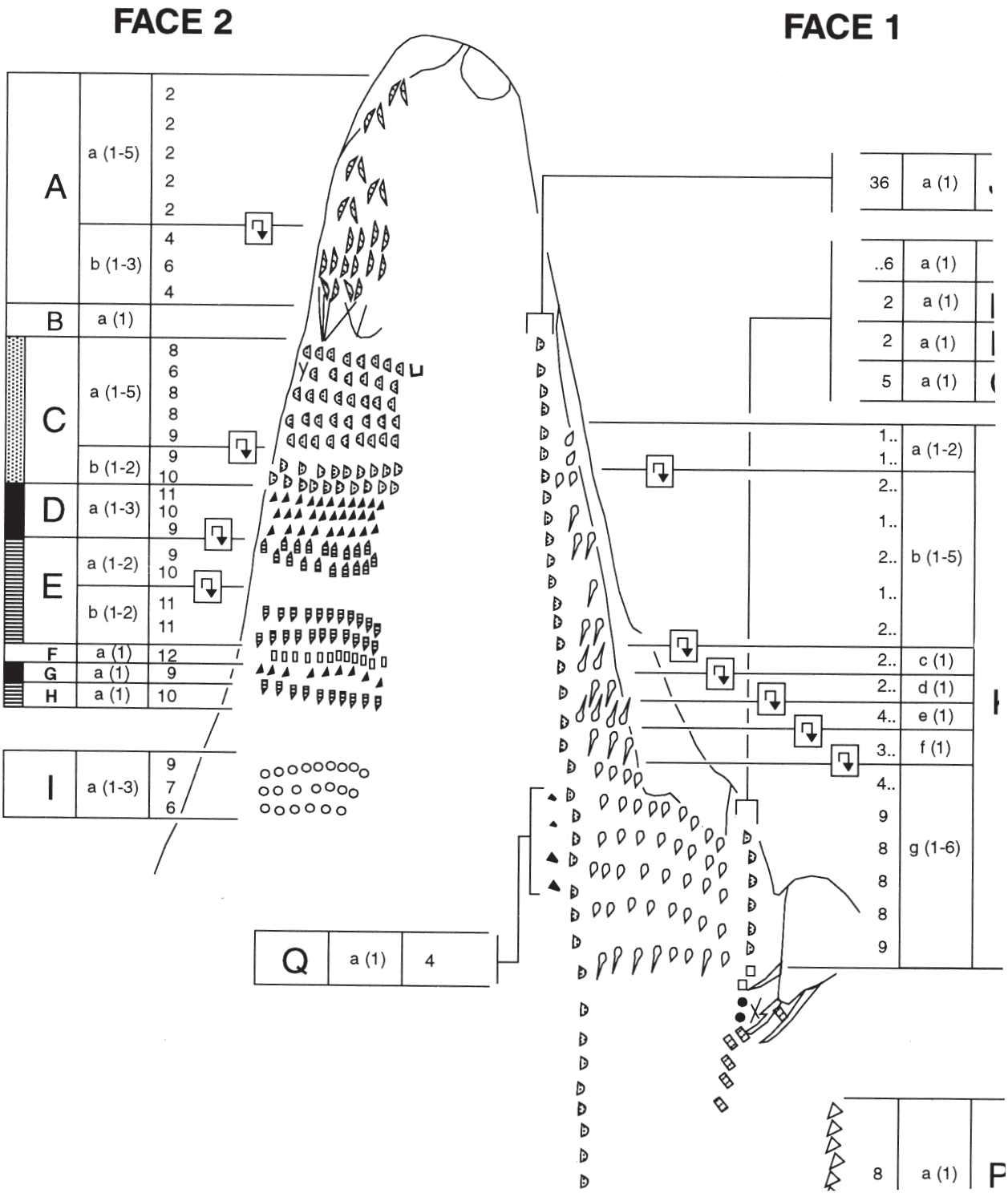


Figure 3.24. *Schematic rendition of the La Marche marks. Capital letters indicate groups of close marks carved by the same point (sets); small letters indicate sub-sets which correspond to a turning of the object between marks produced by the same point. Numbers in parentheses identify rows. Arrows indicate the turning of the object. Patterns near capital letters show sets carved by the same point.*

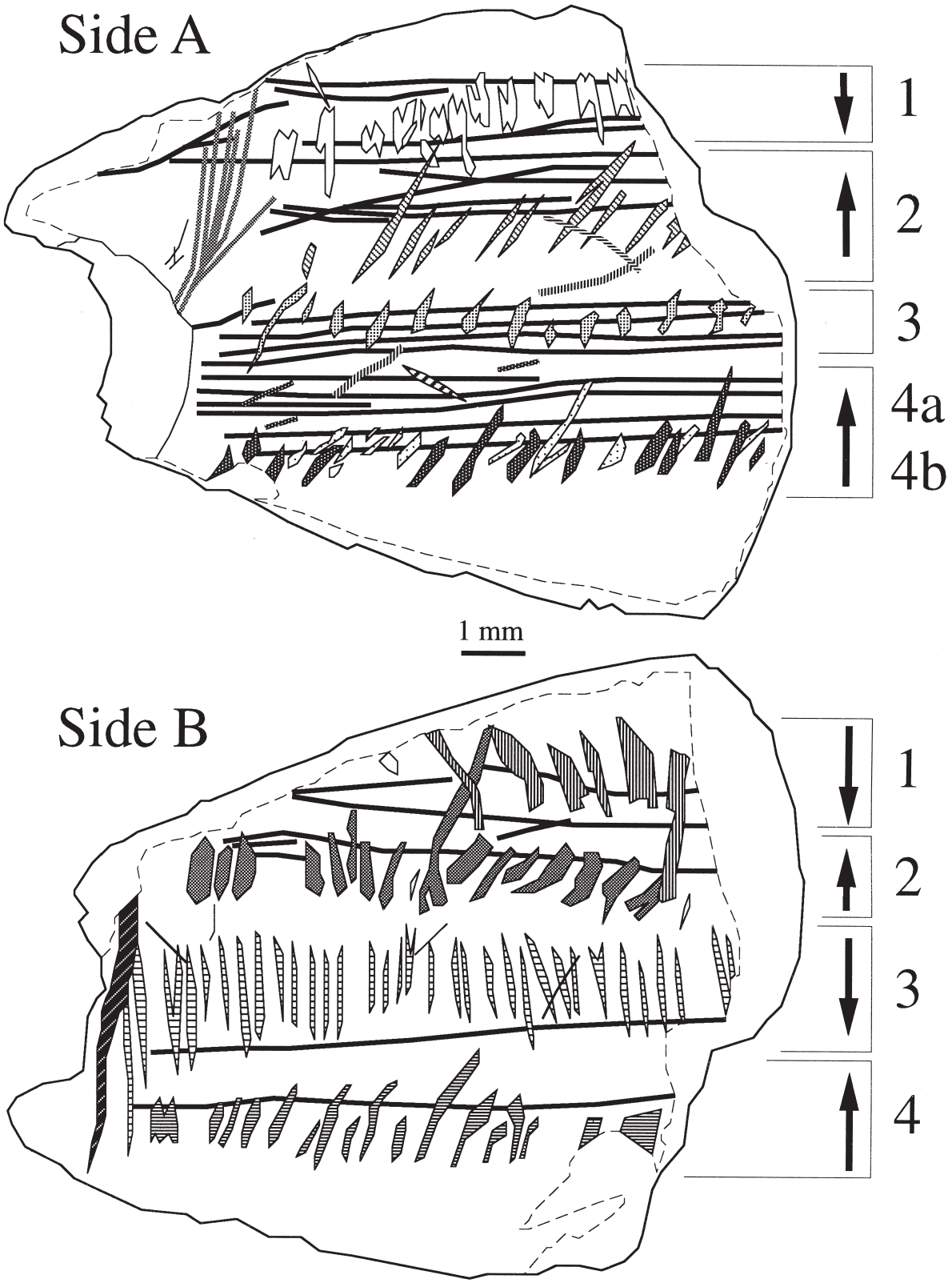


Figure 3.25. *Schematic rendition of the broken pendant from Tossal de la Roca. Each pattern identifies a different point.*

decoration and notation, for instance, are not mutually exclusive possibilities in the engraver's mind, how can we ourselves separate them when we analyze archaeological objects?

In spite of these limitations, results presented here, and research, in progress suggest that codes based on the combination of two and possibly three factors (morphology, spatial distribution and accumulation over time) appear to be present from the beginning of the Upper Palaeolithic. Changes in the organization of the codes and probably in the type of stored information took place during this twenty millennium time-span. Relative continuity, however, exists in the chosen raw material, in the marking techniques, and in the technical skills involved in shaping and marking the objects. These findings have important implications. By comparison with other types of AMS (e.g. writing, computers), we do know whether the techniques used to encode information, the choice of the support, its preparation, and its dimensions are semiologically neutral elements (Harris 1995). They condition the access to information, determine the context in which the information exchange takes place, and often communicate as much as the recorded message itself. As Leroi-Gourhan (1964), Goody (1977; 1987), and Donald (1991), among others, have stressed, each technological innovation, allowing as it does for new forms of information storage and retrieval, determines the condition of knowledge and, ultimately, the functioning of human thought itself. No major qualitative changes can be seen from this point of view in the course of the European Upper Paleolithic. AMSs from this period are conceived of as fitting into just one solid, long-lasting, transportable piece. The need for this is confirmed by the fact that they are in some cases carved on tools intended for use over a long period (Solutré, La Marche) and in other cases possibly worn as personal ornaments (Tossal de la Roca). AMSs that make no formal distinction between marks juxtaposed on a single alignment, or rely on the semiological technique of spatial grouping, seem to dominate. These are *token-iterative* systems, according to Harris' classification. Such systems use codes which are easy to learn.

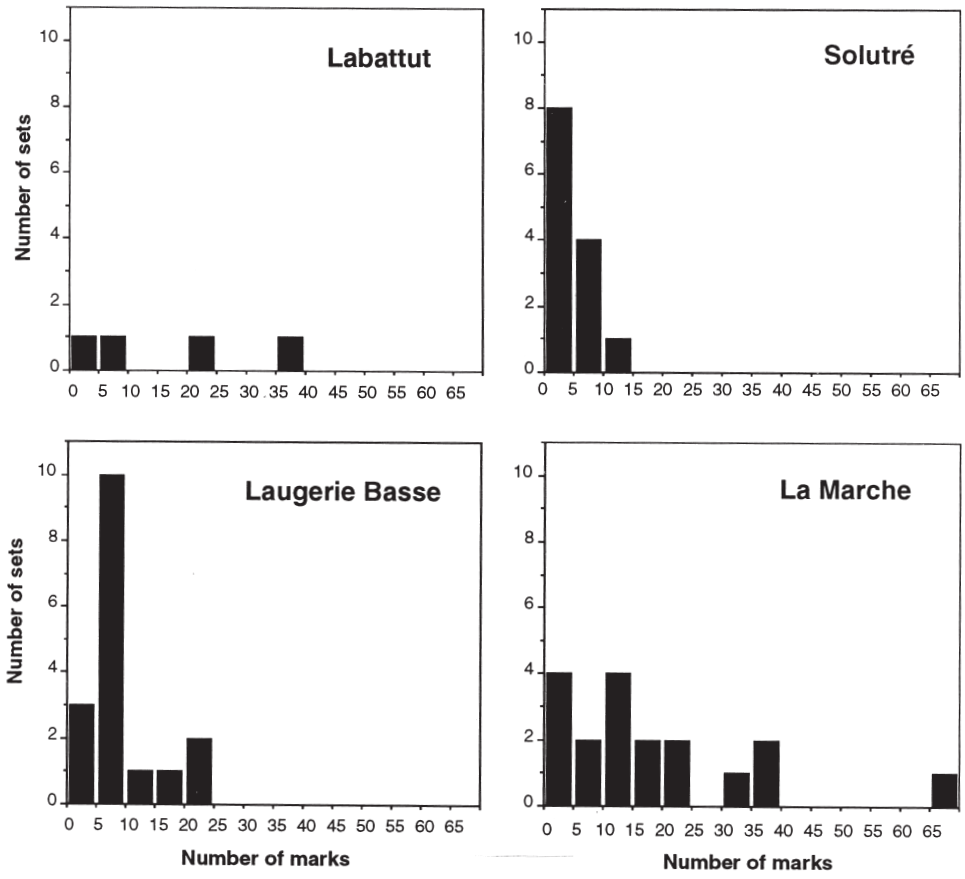


Figure 3.26. *Frequency distribution of number of marks present in each set, on four of the objects studied.*

Emblems, however, are also used, as indicated by some signs on the La Marche antler, clearly intended to be different from the surrounding marks (e.g. set B and marks in set C). One can even wonder whether the apparent absence of emblems is to be attributed to the particular sample, mostly composed of serially abstract isomorphic signs. If Palaeolithic AMSs used depictional representations as emblems, we should address our attention to the hundreds of objects which, like La Marche, associate those representations with markings.

A difference can be observed between the objects within the sample studied here. Unlike the Labattut metapodial and the Solutré rib, the marking procedure on the La

Marche and Tossal de la Roca pieces allows a large number of signs to be stored on a reduced surface (Fig. 3.26). At La Marche, 237 marks form 18 isomorphic sets organized in 48 rows. At Tossal, 134 incisions arranged in 8 rows are fitted into less than 2 cm^2. At the end of the Upper Palaeolithic other objects, all around Europe, show technical know-how similar to that described at La Marche and at Tossal de la Roca (d'Errico & Cacho 1994). For instance, more than one thousand tiny incisions are fitted onto one face of a Late Magdalenian (8 cm long) rib fragment from the Taï site (Marshack 1991a). Nine hundred incisions are engraved on a red deer metapodial found in the Los Azules burial; a comparable number of marks are carved on the Öküzini (Otte *et al.* 1995) and on La Ferrovia pebbles, as well as on the Zigeunerhöhle antler (Marshack 1992). Although the significance of some of these objects is still to be verified, the increase in the number of marks and sets appearing at the end of the Upper Palaeolithic might signal an increase in the volume of stored information. This increase coincides with the use of marking techniques producing many marks on a reduced surface, and with a more systematic adoption of visual perception in the process of recovering information. Objects from La Marche and Laugerie Basse suggest that this is also the moment when complex codes based on the hierarchical organization of information, and the use of formally differentiated marks, are systematically adopted.

These elements of continuity might imply that, during the European Upper Palaeolithic, the production and use of AMSs took place in similar social contexts. It is possible that only a few individuals were fully aware of the more complex codes, and that this competence was only one element of the role that these individuals played within Palaeolithic societies. Individuals specialized in storing memory among preliterate human groups, such as older members of the community, initiated individuals or 'bards', are the best candidates for being those who created, transmitted, and eventually modified AMSs both in their artefactual reality and in the organization of their codes.

This hypothesis is suggested by the relatively low number of these devices in the archaeological record, even at sites which have yielded thousands of well-preserved bone objects. If only a few individuals handled AMSs, could we reasonably expect a change in human cognitive abilities to result from the use of these devices? The answer is positive if we accept the notion that human cognition is socially distributed and that human actions are conditioned by this 'collective' or 'joint' memory (Donald 1991; Hutchins 1995; Thierry *et al*. 1996). Even if used by only a few people, as was the case for writing before printing, there is no doubt that AMSs qualitatively enriched the collective memory of Palaeolithic societies, by changing the minds and the world of Palaeolithic people.

Acknowledgements

I owe a special debt of gratitude to Paola Villa for her critical reading of the manuscript and for her very helpful comments. Stimulating suggestions were also provided by Roy Harris, Merlin Donald and Chris Scarre. I thank Geneviève Lagardère and Marie Perpère, curators of the Musée de Solutré and of the Museé de l'Homme Upper Palaeolithic collections, for allowing me to study the objects presented in this paper. Jean Combier and Pierre Ayrolles have kindly assisted me during the study of the Solutré rib. The CNRS/Royal Society Exchange programme supported my 1996 stay in Cambridge, during which a first draft of this paper was prepared.

Francesco d'Errico
Chargé de Recherche au CNRS
UMR 5808 du CNRS
Institut de Préhistoire et de Géologie du Quaternaire
Av. des Facultés
33405 Talence
France

References

Aiello, L. & R.I.M. Dunbar, 1993. Neocortex size, group size and the evolution of language. *Current Anthropology* 34, 184–93.

Bahn, P., 1996. New developments in Pleistocene art. *Evolutionary Anthropology* 4, 204–15.

Bar-Yosef, O., 1996. Modern humans, Neanderthals and the Middle/Upper Paleolithic transition in Western Asia, in *The Lower and Middle Palaeolithic,* eds. O. Bar-Yosef, L. Cavalli-Sforza, R. March & M. Piperno. Forlì: Abaco Edizioni, 175–90.

Bednarik, R.G., 1995. Concept-mediated marking in the Lower Palaeolithic. *Current Anthropology* 36, 605–34.

Bell, A.J., 1994. Interpretation and testability in theories about prehistoric thinking, in *The Ancient Mind: Elements of Cognitive Archaeology,* eds. C. Renfrew & E.W. Zubrow. Cambridge: Cambridge University Press, 15–21.

Bradshaw, J.L. & L.J. Rogers, 1995. *The Evolution of Lateral Asymmetries, Language, Tool Use, and Intellect.* London: Academic Press.

Brain, R., 1979. *The Decorated Body.* London: Hutchinson.

Bromage, T.G., 1984. Interpretation of scanning electron microscopic images of abraded forming bone surfaces. *American Journal of Physical Anthropology* 64, 161–78.

Byers, A.M., 1994. Symboling and the Middle–Upper Palaeolithic transition: a theoretical and methodological critique. *Current Anthropology* 35, 369–99.

Byrne, R.W. & A. Whiten (eds.), 1988. *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*. Oxford: Clarendon Press.

Chase, P.G., 1991. Symbols and Paleolithic artefacts: style, standardization, and the imposition of arbitrary form. *Journal of Anthropological Archaeology* 10, 193–214.

Chase, P.G., 1994. On symbols and the Palaeolithic. *Current Anthropology* 35(5), 627–29.

Chase, P.G. & H.L. Dibble, 1987. Middle Paleolithic symbolism: a review of current evidence and interpretations. *Journal of Anthropological Archaeology* 6, 263–96.

Chase, P.G. & H.L. Dibble, 1992. Scientific archaeology and the origins of symbolism: a reply to Bednarik. C*ambridge Archaeological Journal* 2(1), 43–51.

Cherry, C., 1980. The communication explosion, in *Symbol as Sense: New Approaches to the Analysis of Meaning*, eds. M.L. Foster & S.H. Brandes. London: Academic Press, 249–67.

Combier, J., 1976. Solutré, in *Livret-guide de l'excursion A8, Bassin du Rhone*. Nice: IX Congrès UISPP, 11–117.

d'Errico, F., 1989. A reply to Alexander Marshack. *Current Anthropology* 30(4), 495–500.

d'Errico, F., 1991. Microscopic and statistical criteria for the identification of prehistoric systems of notation. *Rock Art Research* 8, 83–93.

d'Errico, F., 1992. A reply to Alexander Marshack. *Rock Art Research* 9(1), 59–64.

d'Errico, F., 1993. La vie sociale de l'art mobilier paléolithique. Manipulation, transport, suspension des objets en os, bois de cervidé, ivoire. *Oxford Journal of Archaeology* 12(2), 145–74.

d'Errico, F., 1995a. *L'art gravé azilien. De la technique à la signification*. (XXXIe supplément à Gallia Préhistoire.) Paris: CNRS.

d'Errico, F., 1995b. A new model and its implications for the origins of writing: the La Marche antler revisited. *Cambridge Archaeological Journal* 5(2), 163–206.

d'Errico, F., 1996a. Marshack's approach: poor technology, biased sciences. *Cambridge Archaeological Journal* 6(1), 111–17.

d'Errico, F., 1996b. Image analysis and 3-D optical surface profiling of Upper Palaeolithic mobiliary art. *Microscopy and Analysis* 39, 27–9.

d'Errico, F. & C. Cacho, 1994. Notation versus decoration in the Upper Palaeolithic: a case-study from Tossal de la Roca, Alicante, Spain. *Journal of Archaeological Science* 21, 185–200.

d'Errico, F. & P. Villa, 1997. Holes and grooves. The contribution of microscopy and taphonomy to the problem of art origins. *Journal of Human Evolution* 33, 1–31.

d'Errico, F., J. Zilhao, D. Baffier, M. Julien & J. Pelegrin, 1998. Neanderthal acculturation in Western Europe: a critical review of evidence and its interpretation. *Current Anthropology* 39, 1–24.

Davidson, I. & W. Noble, 1989. The archaeology of perception: traces of depiction and language. *Current Anthropology* 30, 125–55.

Davidson, I. & W. Noble, 1993. Tools and language in human evolution, in Gibson & Ingold (eds.), 363–88.

Didon, L., 1911. *L'abri Blanchard des Roches (commune de Sergeac), gisement aurignacien moyen*. Périgueux: Ribes.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Donald, M., 1993. Précis of *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. *Behavioural and Brain Sciences* 16, 737–91.

Donald, M., 1996. The role of vocalization, memory retrieval and external symbols in cognitive evolution. *Behavioural and Brain Sciences* 19, 159–64.

Duff, A.I., G.A. Clark & T.J. Chadderdon, 1992. Symbolism in the early Palaeolithic: a conceptual odyssey. *Cambridge Archaeological Journal* 2(2), 221–29.

Eccles, J.C., 1989. *Evolution of the Brain: Creation of the Self*. London: Routledge.

Elkins, J., 1996. On the impossibility of close reading: the case of Alexander Marshack. *Current Anthropology* 37(2), 185–226.

Faris, J.C., 1972. *Nuban Personal Art*. London: Duckworth Press.

Festinger, L., 1983. *The Human Legacy*. New York (NY): Columbia University Press.

Foley, R.A., 1996. Measuring cognition in extinct hominids, in Mellars & Gibson (eds.), 57–65.

Foley, R.A. & P.C. Lee, 1991. Ecology and energetics of encephalisation in hominid evolution. *Philosophical Transactions of the Royal Society of London* 334, 223–32.

Gelb, I.J., 1952. *A Study of Writing*. Chicago (IL): University of Chicago Press.

Gero, J. & J. Mazzullo, 1984. Analysis of artefact shape using Fourier series in closed form. *Journal of Field Archeology* 11, 315–22.

Gibson, K.R., 1996. The biocultural human brain, seasonal migrations, and the emergence of the Upper Palaeolithic, in Mellars & Gibson (eds.), 1–8.

Gibson, K.R. & T. Ingold (eds.), 1993. *Tools, Language and Cognition in Human Evolution*. Cambridge: Cambridge University Press.

Gibson, K.R. & P. Mellars, 1996. Introduction: approaches to modelling early human minds, in Mellars & Gibson (eds.), 1–8.

Goody, J., 1977. *The Domestication of the Savage Mind*. Cambridge: Cambridge University Press.

Goody, J., 1987. *The Interface between the Written and the Oral*. Cambridge: Cambridge University Press.

Goonatilake, S., 1991. *The Evolution of Information: Lineages in Gene, Culture and Artefact*. London: Pinter.

Gould, R.A. & P.J. Watson, 1982. A dialogue on the meaning

and use of analogy in ethnoarchaeological reasoning. *Journal of Anthropological Archaeology* 1, 355–81.
Hall, E.T., 1973. *The Silent Language*. New York (NY): Anchor Press.
Harris, R., 1986. *The Origin of Writing*. London: Duckworth.
Harris. R., 1995. *Signs of Writing*. London: Routledge.
Hodder, I., 1979. Economic and social stress and material culture patterning. *American Antiquity* 44, 446–54.
Hublin, J.-J., F. Spoor, M. Braun, F. Zonneveld & S. Condemi, 1996. A late Neanderthal associated with Upper Palaeolithic artefacts. *Nature* 381, 224–26.
Hutchins, E., 1995. *Cognition in the Wild*. Cambridge (MA): MIT Press.
Knight, C., C. Power & I. Watts, 1995. The human symbolic revolution: a Darwinian account. *Cambridge Archaeological Journal* 5(1), 75–114.
Lartet, E. & H. Christy, 1865–1875. *Reliquae Aquitanicae, being Contributions to Archaeology and Palaeontology of Perigord and the Adjoining Provinces of Southern France*. London: Williams & Norgate.
Leach, E., 1976. *Culture and Communication.* Cambridge: Cambridge University Press.
Leroi-Gourhan, A., 1964. *Le Geste et la Parole*. 2 vols. Paris: Albin Michel.
Leroi-Gourhan, Arl. &. A. Leroi-Gourhan, 1965. Chronologie des grottes d'Arcy-sur-Cure. *Gallia Préhistoire* 7, 1–64.
Lestrel, P.E., 1989. Method for analyzing complex two-dimension forms: elliptical Fourier functions. *American Journal of Human Biology* 1, 149–64.
Lévêque, F. & B. Vandermeersch, 1980. Découverte de restes humains dans un niveau castelperronien à Saint-Césaire (Charent-Maritime). *Comptes Rendus de l'Académie des Sciences de Paris* 291, 187–9.
Lindly, J. & G.A. Clark, 1990. Symbolism and modern human origins. *Current Anthropology* 31, 233–61.
Marshack, A., 1964. Lunar notation on Upper Paleolithic remains. *Science* 184, 28–46.
Marshack, A., 1970. *Notation dans les gravures du Paléolithique supérieur. Nouvelles méthodes d'analyse*. Bordeaux: Publications de l'Institut de Préhistoire de l'Université de Bordeaux.
Marshack, A., 1972a. Cognitive aspects of Upper Paleolithic engraving. *Current Anthropology* 13(3–4), 445–77.
Marshack, A., 1972b. *The Roots of Civilisation.* New York (NY): McGraw-Hill.
Marshack, A., 1972c. Upper Paleolithic notation and symbol. *Science* 178, 817–28.
Marshack, A., 1974. The Chamula calendar board: an internal and comparative analysis, in *Mesoamerican Archaeology*, ed. N. Hammond. Austin (TX): University of Texas Press, 255–70.
Marshack, A., 1985. A lunar solar year calendar stick from North America. *American Antiquity* 50(1), 27–51.
Marshack, A., 1987. L'évolution et la transformation du décor du début de l'Aurignacien au Magdalénien final, in *L'art des objets au Paléolithique: Les voies de la recherche.* Foix-Le Mas d'Azil: Ministère de la Culture, 139–58.
Marshack, A., 1988. Paleolithic calendar, in *Encyclopaedia of Human Evolution and Prehistory,* eds. I. Tattersall, E. Delson & J. van Couvering. New York (NY): Garland, 419–20.
Marshack, A., 1991a. The Taï plaque and calendrical notation in the Upper Palaeolithic. *Cambridge Archaeological Journal* 1(1), 25–61.
Marshack, A., 1991b. A reply to Davidson on Mania & Mania. *Rock Art Research* 8, 47–58.
Marshack, A., 1991c. *The Roots of Civilisation*. New York (NY): Moyer Bell.
Marshack, A., 1992. L'evolution et la transformation du décor du debut de l'Aurignacien au Magdalénien final, in *L'art des objets au Paléolithique*, tome 2: *Les voies de la recherche*, ed. J. Clottes. Paris: Ministère de la Culture, 139–58.
Marshack, A., 1995. A middle Paleolithic symbolic composition from the Golan Heights: the earliest known depictive image. *Current Anthropology* 37(2), 356–65.
Marshack, A., 1996. The La Marche antler revisited. *Cambridge Archaeological Journal* 6(1), 99–117.
Mellars, P.A., 1989. Major issues in the emergence of modern humans. *Current Anthropology* 30, 349–85.
Mellars, P.A. (ed.), 1990. *The Emergence of Modern Humans: an Archaeological Perspective*. Edinburgh: Edinburgh University Press.
Mellars, P.A., 1991. Cognitive changes and the emergence of modern humans in Europe. *Cambridge Archaeological Journal* 1(1), 63–76.
Mellars, P., 1996. *The Neanderthal Legacy.* Princeton (NJ): Princeton University Press.
Mellars, P.A. & K. Gibson, 1996. *Modelling the Early Human Mind*. (McDonald Institute Monographs). Cambridge: McDonald Institute for Archaeological Research.
Mithen, S.J., 1996. *The Prehistory of the Mind: a Search for the Origins of Art, Religion and Science.* London: Thames & Hudson.
Morris, J. & E. Preston-Whyte, 1994. *Speaking with Beads: Zulu Arts from Southern Africa*. London: Thames & Hudson.
Noble, W. & I. Davidson, 1993. Tracing the emergence of modern human behaviour: methodological pitfalls and a theoretical path. *Journal of Anthropological Archaeology* 12, 121–49.
Oakley, K.P., P. Andrews, L.H. Keeley & D. Clark, 1977. A reappraisal of the Clacton spearpoint. *Proceedings of the Prehistoric Society* 43, 13–30.
Otte, M., I. Yalcinkaya, J. Leotard, M. Kartal, O. Bar-Yosef, J. Kozlowski, I. López Bayón & A. Marshack, 1995. The Epi-Palaeolithic of Öküzini cave (SW Anatolia) and its mobiliary art. *Antiquity* 69, 931–44.
Palma di Cesnola, A., 1993. *Il Paleolitico superiore in Italia*. Firenze: Garlatti e Razzai.
Peyrony, D. & J. Maury, 1914. Le gisement préhistorique de Laugerie-Basse. *Revue Archéologique*, 134–54.
Pulgram, E., 1976. The typologies of writing-systems, in *Writing Without Letters*, ed. Haas. Manchester: Manchester University Press, 1–28.

Robinson, J., 1992. Not counting on Marshack: a reassessment of the work of Alexander Marshack on notation in the Upper Palaeolithic. *Journal of Mediterranean Studies* 2(1), 1–16.

Russell, J., 1996. Development and evolution of the symbolic function: the role of working memory, in Mellars & Gibson (eds.), 159–70.

Saussure, F. de, 1922. *Cours de linguistique générale*. Paris: Payot.

Shipman, P. & J.J. Rose, 1988. Bone tools: an experimental approach, in *Scanning Electron Microscopy in Archaeology*, ed. S.L. Olsen. (BAR International Series 452.) Oxford: BAR, 303–35.

Simek, J.F., 1992. Neanderthal cognition and the Middle to Upper Palaeolithic transition. in *Continuity or Replacement: Controversy in Homo sapiens Evolution*, eds. G. Braur & F.H. Smith. Rotterdam: Balkema, 231–45.

Singer, R. & J. Wymer, 1982. *The Middle Stone Age at Klasies River Mouth in South Africa*. Chicago (IL): University of Chicago Press.

Sonneville-Bordes, D. de, 1960. *Le Paléolithique supérieur en Périgord*, vol. 2. Bordeaux: Delmas.

Strathern, A. & M. Strathern, 1971. *Self Decoration in Mount Hagen*. London: Duckworth.

Stringer, C. & C. Gamble, 1993. *In Search of the Neanderthals*. New York (NY): Thames & Hudson.

Taborin, Y., 1990. Les prémices de la parure, in *Paléolithique moyen recent et Paléolithique supérieur ancien en Europe*, ed. C. Farizy. Nemours: Musée de Préhistoire d'Ile de France, 335–44.

Thierry, B.G., J.Y. Theraularz, P.Y. Gautier & B. Stiegler, 1996. Joint memory. *Behavioural Processes* 35, 127–40.

Wendt, W.E., 1974. 'Art mobilier' aus der Apollo 11-Grotte in Sudwest-Africa: die altesten datierten Kunstwerke Afrikas. *Acta Praehistorica et Archaeologica* 5, 1–42.

White, R., 1982. The manipulation of burins in incision and notation. *Canadian Journal of Anthropology* 2(2), 129–35.

White, R., 1992. Beyond art: toward an understanding of the origins of material representations in Europe. *Annual Review of Anthropology* 21, 537–64.

Wylie, M.A., 1985. The reaction against analogy, in *Advances in Archaeological Method and Theory*, vol. 8, ed. M.B. Schiffer. London: Academic Press, 63–111.

Wylie, M.A., 1988. 'Simple' analogy and the role of relevance assumptions: implications of archaeological practice. *International Studies in the Philosophy of Science* 2, 134–50.

Chapter 4

Material Artefacts, Symbolism, Sociologists and Archaeologists

David Halle

The classic debate between 'idealists' and 'materialists' usually revolves around the most appropriate causal relation between material artefacts and cognition. This paper argues that the debate is, in practice, often empirically and conceptually arid since the most interesting questions usually, in fact, revolve around tracing the appropriate causal relations between two groups of symbols, *with each group consisting of* both *material artefacts and their native-assigned meanings. The paper illustrates this point via a study of the causal relation between (a) the art (symbols composed of material artefacts and native-assigned meanings) displayed in the homes of various social classes in the New York region and (b) the homes and neighbourhoods (symbols composed of material artefacts and native-assigned meanings) in which the art is displayed. The paper also addresses other theoretical issues concerning the relation between material artefacts, symbols and cognition.*

As a sociologist who studies advanced industrial societies, I could not hope to address the *historical and archaeological* questions raised by Donald's analysis of 'external symbolic storage'. However some of the *theoretical* issues concerning the relation between material artefact, symbols, and cognition, are also faced by, and hotly contested among, those who study the modern world.

The sociologist addresses these issues in a context that has some consequential differences from that of the archaeologist. First, all the data needed are, in principle, collectible. This is especially true of cognitive data regarding the way the artefacts are viewed by the people who own, use, and reside near them. I will refer to these people as 'natives' in this paper. Thus the sociologist might be able to trace out, in a particular empirical context, a number of subtleties and complexities in the relation between material artefact, cognition, and symbolic meaning. The archaeologist can often only suggest these subtleties as possibilities, as in Dowson's (this volume) interesting analysis of the Upper Palaeolithic cave art of Europe.

Another difference is that the sociologist is reporting about everyday artefacts to people who inhabit the same, or a comparable, society as that of the artefacts being studied, and who are themselves likely to possess similar artefacts. Since there is no point in telling people what they already know, a sociologist is apt to seek discoveries that go beyond common sense in surprising ways. Thus the sociologist is prone to seek symbolic meanings and causal links that transcend what natives can easily discern. At the same time, natives may not only read the sociologist's theories regarding their artefacts but also have an opportunity to disagree with the theories.

In this paper, I begin by sketching some issues and complexities entailed by the analysis of artefacts as symbols. I then illustrate these points by drawing on my research on art/artefacts as displayed in the modern home.

Symbolism and its complexities I

The symbolism or meaning of artefacts

Renfrew (1994), following *Webster's Collegiate Dictionary* (1925, 947), has defined a 'symbol' as something which stands for, or represents, something else: 'a visible sign of an idea or quality or of another object'. It follows that the 'symbolism' of artefacts is closely associated with the notion of 'meaning', for the link between the artefact/symbol and what it 'stands for or represents' (or symbolizes) in most cases goes through the minds of natives, outside observers, or both. Only via this link can the 'symbol' stand for or represent something else. This is why, after discovering what the 'symbol' refers to, we often then also talk about its 'meaning'.

The range of symbolic meanings

If any artefact that has any meaning assigned to it, by a native or by an outsider, is, in principle, a symbol, it follows that the field of potential and actual symbols is gigantic. Thus although I am not opposed to attempts to classify symbols into various types, the categories that constitute such classifications are unlikely to offer more than some preliminary ideas. Typologies based on simple trichotomies such as Peirce's, or even more complex categorizations, cannot be adequate by themselves, although they might draw attention to interesting aspects of the problem of classifying symbols. There is no substitute for the difficult work of uncovering the symbolism of particular types of artefacts in particular types of social setting.

Focusing on 'interesting' symbols/meanings

Although any artefact that can plausibly be associated with any meaning can, in principle, be called a 'symbol', in practice the researcher tends, quite appropriately, to focus on artefacts whose meaning(s) are deemed to be of special interest. Indeed, when we apply the term 'symbol' to certain artefacts it is usually in order to indicate that we have found such specially interesting meanings.

What is deemed of 'special' interest will, of course, vary by time and by place, and will also inevitably involve value judgements. Sometimes the symbols/artefacts that are deemed, because of their meaning(s), to be of 'special' interest, are explicitly recognized as such by natives. The archaeologist or anthropologist writing for an audience that inhabits a very different society from the natives may, therefore, present material that is well known to the latter. But the artefacts whose meaning is discovered by an outsider may be of great interest too precisely because their symbolic meaning was not hitherto apparent to natives. For the reasons that I already mentioned, a sociologist is especially interested in such meanings and symbols.

Native-assigned symbolism/meaning, outsider-assigned symbolism/meaning, and the contestability of outsider-assigned symbolism/meaning

An important complexity in the analysis of the symbolic meaning of artefacts results from the fact that the meaning(s) that natives assign to them are not *exhaustive* of the range of meanings the artefacts might have. Perhaps natives assign one meaning to an artefact, but an outsider who locates the artefact in a broader context may discern an additional symbolism/meaning of which natives are partly, or even entirely, unaware. Donald's concept of 'external symbolic storage' does this, as does Zubrow's suggestion that a particular ancient map is a 'forerunner of our three-dimensional relief maps'.

Nor can the meaning that natives assign to an artefact be taken as definitive. Perhaps they give it one meaning, but an outsider might determine that they are, at least in part, incorrect. They might, for example, believe that a particular artefact has *positive* connotations not only for themselves but also for *everyone else* in the society, whereas an outsider, with access to additional data on how the artefact is seen, might discover that it is viewed *negatively* by some sections of the populace.

Thus, in analyzing the symbolism/meaning of a material artefact, reference to the meaning assigned to it by natives may be both indispensable and non-definitive. In this light, the most that an outsider/researcher who attributes certain kinds of symbolic meanings to artefacts can hope to achieve is interpretations which can be compared with one another for plausibility and tested (supported and even sometimes refuted) in the light of new data. (See Lukes 1975 for an excellent discussion of the issues involved in allocating symbolic meaning.)

In this paper, I will sometimes, for convenience, designate the artefactual meanings of which natives are more or less aware as MN-NAT. I will designate the artefactual meanings that are added by an outsider as MN-OUT. In practise, there is also an interesting middle category of artefactual meanings, for example those meanings of which natives are somewhat or implicitly aware but to which an outsider can draw explicit attention. I will sometimes refer to this middle category too.

Causal relations between structures of symbols, versus causal relations between the 'material' and the 'cognitive'[1]

Sociologists have been as fascinated as archaeologists by the attempt to produce a general theory of what is the most appropriate *causal relation* between material artefacts and cognition. In both disciplines, much of the debate over this question revolves around the merits of two polar positions, the 'materialist' versus the 'idealist' perspective. For example, does a particular material artefact, or cluster of related artefacts, generate appropriate cognitive representations — the 'materialist' approach to causality? Or, on the contrary, does cognition generate material artefacts — the 'idealist' approach to causality? These extreme positions — materialism and idealism — may make for dramatic intellectual statements, but they often fit the data less well than a middle position — 'cognitive-materialism'. Thus in many cases the typical causal relation between material artefact and cognitive representations is interactive, both levels being causally important without one being causally primary. For example, it would be hard, though not impossible, to generate a *particular artefact*, such as a tool or a type of painting such as a landscape, without some *prior idea* of that tool or landscape painting. Likewise it would be hard, though not impossible, to have the *idea* of a particular tool or of an abstract painting without having seen *some prior examples* of tools or landscape paintings, in some form or other.

If the 'materialist' versus 'idealist' debate often fizzles out because the actual relation is interactive, analysis of the meaning of artefacts raises a perhaps equally interesting question. Is there an important *causal* relation between two symbols (each consisting of material artefacts and their respective native-assigned meanings). Likewise, is there an important causal relation between two groups of symbols (each group consisting of material artefacts and their native-assigned meanings[2])? Having the confidence to answer in the affirmative often requires much data about the artefacts and about the native-assigned meanings. But a successful analysis along these lines, entailing as it does the demonstration of a causal relation between two or more symbols/groups of symbols — here *combinations of artefact and cognition including native-assigned meaning* — side-steps the 'materialist'–'idealist' debate as to whether cognition causes material artefacts or *vice versa*. It is just as revealing to debate whether one symbol or group of symbols causes another.

In the following section, I will illustrate these points about the analysis of symbols in the context of my own work on art/artefacts as displayed in the modern home.

The mode of dwelling in the sociology of twentieth-century art/aesthetics

In understanding twentieth-century art, some of the most interesting symbolic meanings have been overlooked because we have ignored one of the central contexts within which art should be understood, namely the modern house and the neighbourhood in which it is located. The modern house and neighbourhood is a rich combination of symbols — material artefacts and native-assigned meanings. Researchers interested in placing twentieth-century art in a context have tended, instead, to stress the *mode of production* (either the mode of production in society generally or the production of art itself) or the contexts of museums and galleries. But the majority of paintings in the last 150 years were first purchased by individuals for display in their own homes. Usually it is only after many people have for some time been purchasing the works of a particular artist, or a specific artistic genre, to display in their homes that the works begin to be displayed in museums and galleries. We need, therefore, not only to focus on the urban and above all suburban context of much modern life but also to enter the houses themselves, look at a range of trends in addition to suburbanization, and link the art and culture within to the social life of the house and its neighbourhood context.

This approach can throw new light on some of the main developments in twentieth-century Western art, such as the attraction of abstract art for its audience; the decline of the proclivity for adults to want to commission and display painted portraits of themselves; or why 'tribal' artefacts came to be displayed, and prized, as art. In short, the house and neighbourhood — a complex combination of symbols composed of material artefacts and native-assigned meanings — has an important impact on the art displayed there, i.e. on another complex combination of symbols composed of material artefacts and native-assigned meanings.

I developed my findings in a book entitled *Inside Culture: Art and Class in the American Home* (Halle 1993) which is a study of the art found in the houses of a cross-section of social classes in the New York region. The data are drawn from a sample of the houses of the upper and middle class as well as the working class. Here I will sketch my findings with

reference to just two genres — abstract art and 'primitive' art. Both these genres are found primarily in the homes of the well-to-do, rather than the working class.

'Primitive' and abstract art as artefact/symbols

'Primitive' art

Only in the twentieth century did Westerners begin to view 'tribal' artefacts as art.[3] During the previous century, ethnographic museums often preserved these objects and presented them — Darwin style — as indicators of the technological level reached by the societies that produced them. Earlier, they had been for the most part either ignored or viewed with horror as examples of pagan idol worship (Goldwater 1986; Rubin 1984; Stocking 1985; Ames 1992).

Until recently, the standard explanation as to why 'tribal' artefacts came to be displayed as 'art' in the West stressed the *aesthetic acumen* of certain artists, directors of cultural institutions, and critics, and the context of museums and galleries (Newton *et al.* 1975; Newton 1978). This explanation became so standard that it has been referred to, ironically, as the 'origin story of modernism' (Clifford 1988). Thus 1906–7 when a few vanguard figures — Picasso, Matisse, Apollinaire, and others — 'discovered' the aesthetic merits of African and Oceanic masks and figure sculptures, was a significant year for this view. The conventional explanation further stresses how, later, the directors of select galleries and art museums recognized the aesthetic merit of 'primitive' art. Examples in the United States, all located in New York, include the 1914 display by the Alfred Steiglitz Gallery of African figures, the first exhibition anywhere of African sculpture as art; the 1935 Museum of Modern Art show 'African Negro Art', which stressed 'primitive' art's influence on modern painting and sculptures; the 1957 opening of the Museum of Primitive Art in New York (the first American museum devoted to 'primitive' art); and the agreement by the Metropolitan Museum of Art, in the late 1960s, to absorb the Museum of Primitive Art and build a special wing to house it.

Yet there are good historical reasons for assigning a central place also to the analysis of 'primitive' art in the context of the modern home. Long before the objects of tribal societies found their new places in major Western art museums, they had already made their way into private homes. As Susan Vogel, the director of the Museum (formerly Center) for African Art in Manhattan, has written, 'Until the 1970s, except for sporadic art exhibitions and natural history museum displays in a few large cities, little African art was to be seen in America if it was not in private homes' (Vogel 1988, 4–5).

What can be discovered from analyzing 'primitive' art in the context of the house? Among the New Yorkers I interviewed — both those who lived in Manhattan and those who lived in the suburbs — the largest category of 'primitive art' displayed was from Africa, and the African art they displayed consisted primarily of images of the person in the form of figures, heads or masks. This raises a central question. Why do these white, upper-middle class Americans, who usually live in segregated neighbourhoods from which African-Americans born in the United States are typically excluded (by economics or prejudice or both) display images of Africans in their homes in a place of honour?

An important part of the answer came from discovering that displaying 'primitive art' is highly correlated with political party affiliation. Table 4.1 shows that, in terms of attitudes towards 'primitive' art, there is a marked difference between two types of residents who display 'tribal' art. One group places the art in a position of honour and views it as coequal to the best of Western art. Among such residents, 66 per cent are registered Democrats and 29 per cent are unregistered. Only 5 per cent (two households) are registered Republicans. A second group, much smaller in number, views the art either with derision or in Darwinian terms as the precursor of forms later perfected in the West.

The reason why the respectful display of images of 'primitive' persons, at least those from Africa, the predominant type, should be highly correlated with Democratic politics is not hard to discern. The art of Africans is associated in the United States with the cultural tradition of American blacks — African-Americans; to respect African art is to respect, one or two steps removed, African-Americans. Further, to introduce an image of a black into a white house and neighbourhood is to violate, albeit symbolically and privately, the racial segregation that pervades American neighbourhoods. Almost everyone in the city or suburbs knows if their own and nearby neighbourhoods are 'white', 'black', or (in unusual cases) racially mixed.[4] To display an image of a black African in a place of honour in a modern American house could scarcely be an innocent or accidental act. Now, in the field of modern American politics the Democratic party is firmly viewed as the party that is associated with African-Americans. Indeed, of the various groups — the South, the poor, blue-collar workers, Catholics and Jews, blacks — that once

constituted the famous electoral coalition that coalesced around Franklin Roosevelt and the Democratic party, nowadays only blacks remain as committed Democratic party voters. It is, therefore, understandable that those who esteem 'primitive', especially African, art should also be Democratic in their politics.

Yet not all who display 'primitive' art view it with respect. A minority of residents who display 'primitive' artefacts deride them or perceive them as inferior versions of forms later perfected in the West. Residents of such households are either Republicans or non-voters; none are Democrats (Table 5.1).

Consider this in detail. Four of the households viewed their artefacts with derision. For example, a Manhasset woman had an African mask in her bathroom '. . . as a joke. Sometimes it scares people, and then we have a good laugh'. An East Side woman who had a Polynesian face on her kitchen wall commented that it was 'bizarre having a cannibal in the kitchen!' In addition to these households where 'tribal' persons are ridiculed, three other households display items that, while not intended as derogatory, present 'tribal' societies from an evolutionary perspective as inferior versions of forms later improved upon by Western society. For example, a priest in Manhattan who directed the Catholic missionary effort abroad saw 'primitive' artefacts as precursors of Christianity. As he said, 'When I look at these I feel I'm at the pre-faith experience. Like they do have a concept of an afterlife. You can trace the development of the church from these kinds of beliefs.' His collection was arranged accordingly to record the progress toward Christianity of the people he studied. The 'tribal' artefacts hung on the wall that led from the third floor to his fourth-floor apartment; his apartment above was full of the symbols of Christianity — the entire layout a metaphor for the ascent of mankind from pagan to Christian beliefs.

Thus 'primitive' figures can be symbols of the Right (as well as of the Left), echoing and perhaps updating a long tradition (which flourished in America from the 1890s to the 1950s, declining with the assertion by African-Americans of a more aggressive identity during the Civil Rights Movement) of using material objects — salt and pepper shakers, cookie jars, ashtrays, etc. — that depict black people in a degrading and stereotyped manner as subservient, powerless, and often with grossly caricatured features (Dubin 1987). In the United States, Aunt Jemima is the best-known character depicted in such objects.

This political aspect of the display of 'tribal' artefacts goes some way toward explaining both the dominance of African art and the dominance of images of the person among the 'tribal' artefacts displayed in the houses sampled. African art is clearly an appropriate symbol for the expression of attitudes toward American blacks ('African-Americans'), and figures and faces are clearly better at this than are pottery, jewellery, and fabrics, which non-experts might not recognize as the art of black Africans.

'Primitive' art, in this context, is (at least partly) about attitudes toward blacks, as it was also, in important ways, in Europe in the early decades of this century — albeit with differences reflecting the changed time and place. Clifford (1988), who recently criticized conventional explanations for the attraction of 'primitive' art in the West which focus on the aesthetic taste of certain artists and writers in Paris in the 1900s, makes the European case clear. Picasso, Apollinaire, and the others 'discovered' 'primitive' art in the context of a period of growing 'negrophilie' in Paris and elsewhere in Europe. This included the recognition of a variety of evocative black figures — the jazzman, the boxer (Al Brown), and the 'sauvage' Josephine Baker. Enthusiasm for African art was thus linked to racial perceptions of blacks, who, in Europe, were prized for their vitality, rhythm, and erotic and magical power.

The idea that displaying African art is, at least in part, to do with symbolizing the way residents feel about African-Americans is supported by observing that the vogue for displaying images of 'tribal' Africans as art began among the American upper-

Table 4.1. *Political affiliation of residents who have 'primitive' art, by their attitude to the art.*

	Attitude to their 'Primitive' Art	
	View it as Co-Equal with Western art[b]	View it with Disrespect or in Darwinian Terms[c]
Political Affiliation[a]	(%)	(%)
Democratic	66	0
Republican	5	60
Unregistered	29	40
	100	100
Total	**(N = 93)**	**(N = 15)**

Note: chi square < p .01.

[a] The source for this data on political affiliation is respondents' voter-registration records. Households with 'primitive' art where husband and wife have each registered for a different political party were excluded; however, such cases are rare (only three households).

[b] Respondents who view 'primitive' art as co-equal with Western art are defined as those who both view their 'primitive' artefacts as art and do not meet the criteria for a 'disrespectful/Darwinian' attitude as defined in note c.

[c] Includes respondents who make derogatory comments about their 'primitive' artefacts, as well as respondents who, while not making explicitly derogatory comments, view the artefacts from an evolutionary (Darwinian) perspective, as inferior versions of forms later perfected in the West. Note that if one spouse made a derogatory comment about the art, it is assumed here that the other spouse's attitude is also derogatory.

middle class on the East Coast in the 1920s, 1930s, and 1940s, the period when African-Americans from the South started to migrate north in large numbers and to fill out urban ghettos in cities such as New York and Philadelphia. For politically liberal Northern whites, displaying such artefacts would have been, and continues to be, a gesture towards the ancestral culture of these now numerous black residents of the region.

This indicates the unduly monocausal character of the traditional view that avant-garde whites in New York in the 1920s and 1930s came to accept African artefacts as art because they were influenced by the aesthetic tastes of the New York art élite, who were in turn influenced by the Parisian artists who 'discovered' African art. This view surely contains much truth, but to link the new white taste for African art to the Harlem Renaissance and to contemporary demographic movements of blacks into the region is just as plausible, and indeed each perspective enriches the other.

Abstract art

Abstract art offers a second case study of some of the theoretical points raised by the analysis of the symbolic meaning of material artefacts.

When I interviewed well-to-do New Yorkers who displayed abstract art in their homes about the reasons why they liked abstract art, the largest group said that it was the design or decorative qualities that attracted them to the works. Examples of comments are: 'I like this painting because of the vibrant colours.' 'We have a sedate room, and this painting explodes. It gives the room colour.' 'This painting brightens up the wall.'

Now if a central reason for the popularity of abstract art as displayed in the home is its decorative qualities, then a key to understanding its attraction for twentieth-century audiences may lie in the history of home decoration. In the early twentieth century an attack on decorative wallpaper, and a move to promote plain white walls, was mounted by representatives of 'modernism', the International Style. For example, Le Corbusier proclaimed in 1925 that 'The tasks of our age — so strenuous, so full of danger, so victorious — seem to demand that we think against a background of white.' The avant-garde's successful promotion of plain, painted walls, especially white walls, over ornamental wall paper, raised a problem. How to decorate white walls? Abstract art, arguably, represented a solution to this problem. Now lines, patterns, and designs could return, not as despised wallpaper but repackaged and reframed as 'abstract art'.

Some qualifications. This is an argument about the reasons why abstract art was attractive to the audience who purchased it. I am not suggesting that the *artists* who produced abstract art did so primarily in order to decorate plain white walls. Nor do I want to argue that the vogue for white walls was the only cause of the attraction of abstract art among twentieth-century audiences. But I do suggest that it was a central cause, one which has been overlooked.[5]

Conclusion: symbolism and its complexities II

The preceding analysis illustrates the following theoretical points about the analysis of material artefacts and symbols.

Causal relations between structures of symbols, versus causal relations between the 'material' and the 'cognitive'

Groups of symbols can plausibly have a causal relation with other groups of symbols. The symbols (here material artefacts and native-assigned meanings) that constitute the modern house and neighbourhood have had an important causal impact on the symbols (material artefacts and native-assigned meanings) that constitute the display of African art in the home and that constitute the display of abstract art.

To assert that the context of house and neighbourhood has an important causal impact on the display of art is not, therefore, to assert the primacy of the 'materialist' over the 'idealist' perspective. What is actually being asserted, and what is often asserted (though not always explicitly) in many so-called 'materialist' analyses of artefacts, is the causal importance of one group of symbols composed of meaning and material artefacts over another group of symbols composed of meaning and material artefacts.

Native-assigned symbolism/meaning, outsider-assigned symbolism/meaning and the uncontrolled process by which tastes in art/culture emerge

Understanding the display of African art, or of abstract art, in the context of the home and neighbourhood enables an outsider to add *meanings* (MN-OUT) that are not especially apparent to those who display the artefacts. In the modern world, the (*symbolic*) *meanings* of art are unlikely to be neatly packaged and controlled and visible to natives, or even to an especially 'cultivated' section of natives. Those who purchase and enjoy art, including the well-to-do and highly educated, are often unaware of some

of the central reasons for their aesthetic choices and of some of the most important (symbolic) meanings of the artefacts as displayed in their own homes. In my own research I discovered that while the upper-middle class who display art can usually talk at length about such topics as the biography and personal circumstances of the artist who produced the work, they can often say very little, have often thought very little, and are often unaware entirely, of some central features of their choices in the aesthetic realm. For example, upper-middle class New Yorkers have rarely thought about the relation between their decisions to display African figurines, faces or masks, on the one hand, and the partially or heavily racially segregated neighbourhoods in which most of them live, on the other hand. They have certainly never considered their decision to display abstract art on their walls in the context of the history of the decline of nineteenth-century decorative wallpaper and the rise of the twentieth-century vogue for white walls. These causes of, and motives for, 'aesthetic' choices are not usually repressed, in the Freudian sense of the term. They are simply not apparent to the people making the choices, although they can be made apparent by research. Thus theories of the origin and nature of aesthetic choices are likely to be inadequate if they fail to acknowledge that people are often unaware of some of the main reasons for their choices. Tastes in art often result from a complex and continual interaction between artists, critics, and the purchasing audience. This process is less centred and beyond the ability of any group fully to monitor, let alone control, than is often thought.

This finding undermines an extremely popular model for understanding the reception of twentieth-century artefacts. This model is implied by most versions of 'cultural capital' theory (associated especially with Bourdieu 1984) and by most versions of 'Frankfurt' and 'neo-Frankfurt' analyses of culture (associated with Horkheimer & Adorno 1972; Marcuse 1978; Baudrillard 1988).[5] According to this model, artists, critics and other cultural gatekeepers create artistic *meaning* and new aesthetic sensibilities, which they then offer to the audience. The audience, if it is sufficiently cultured, then accepts these meanings and sensibilities, more or less as they are passed along. This model, which implies that artists and critics are the driving force of aesthetic and cultural history and have mastered the most important meanings (symbolism) of the art/artefacts, is highly flattering to the artists and critics, which is one reason why the model is so popular in the art world and among those who write about these topics. The truth is that artists and critics and other so-called cultural 'gatekeepers' are less in control of the meaning of these symbols, and more likely themselves to be reacting to wider forces that mediate not only their tastes, but above all the tastes of the audience for art, than is often thought.

The contestability of outsider-assigned symbolism/meaning

Some natives are likely to contest these meanings attributed by an outsider. There are, for example, natives who are, and will remain, convinced that the primary meaning of art is 'aesthetic'. These people would contest an interpretation that suggested that images of Africans displayed in the home often symbolize attitudes towards contemporary African-Americans.

Much effort has been invested by many art critics, art historians, and social theorists in support of the view that those who chose abstract art have superior aesthetic sensibilities to those who chose representative art. The claim that, on the contrary, many of those who display abstract art may be doing little more than decorating plain white walls is not, therefore, likely to be well received in some quarters. (For example, a famous historian of modern art, on hearing my findings that disputed his image of the typical audience for abstract art, referred angrily to the audience as 'these specimens'.)

In truth, the extent to which the meanings are apparent to natives who display African artefacts will vary. For some natives, the meanings may fall into the category that is midway between MN-NAT and MN-OUT. They are meanings of which natives are somewhat or implicitly aware but to which an outsider can draw explicit attention.

Transitions from 'symbol' to 'artefact with meanings'

Artefacts with meanings can be upgraded to merit designation as 'symbols'. Likewise artefacts that are, at one time, deemed to merit designation as symbols may be downgraded to artefacts with meanings. Any artefact that can plausibly be assigned any meanings can, in theory, be called a 'symbol', but in practice, as I suggested, the term 'symbol' is used to draw attention to a class of artefacts whose meanings are deemed of particular interest. It follows that if the determination, for a particular artefact, as to what is of special interest changes, so may the decision as to whether the artefact should be designated a 'symbol'. Thus it is only when we suggest that African figures may have more than aesthetic meaning for their owners that it becomes useful to refer to these artefacts as 'symbols'.

Likewise, it might be appropriate to cease referring to a particular artefact and its meanings as a 'symbol' if it turns out that artefact's meanings are less interesting than was once thought. Abstract art has long been viewed as a symbol of the superior aesthetic sensibilities of those who display the art. But if those who display the art are often engaged in the mundane act of just 'decorating' their rooms and walls, then we may decide to cease designating abstract art as a symbol of superior aesthetic sensibility. Instead, abstract art displayed in the home may not deserve more attention than any other decorative artefacts, such as wall mouldings and special light fixtures.

Thus artefacts with meanings that turn out to be interesting can be upgraded to merit designation as 'symbols'. Likewise artefacts that once merited designation as symbols may be downgraded to artefacts with meanings.

The range of symbolic meanings of art/artefacts

The variety of interesting meanings that can legitimately be found in the symbols that constitute the art/artefacts displayed in the home is not well conceptualized or captured by the simple notion that these artefacts/symbols 'reflect' society. (The usefulness of the 'reflection' metaphor is probably limited to its being taken as stating a general claim that art needs to be understood in the context of various structures in the social realm, as well as in other contexts.) For the idea that art 'reflects' society can be substituted an empirical account of the meanings/symbolism of the art/artefacts. Does art, and do these artefacts in particular, idealize society, pseudo-idealize society, compensate for it, constitute a metaphor for it, or even simply reflect it? The empirical answer is that it is an empirical question, for art relates to society in all of these ways, and more.

To illustrate this I will draw examples not only from my findings concerning abstract and 'primitive' art, but also from my findings concerning landscape depictions, family photographs and religious iconography. Family photographs are complex symbols that, just in their mode of display alone, depict both the ideal of family closeness (in their clustered mode of display) and its *opposite,* family fragility (in their movable mode of display). Landscape depictions pursue another pervasive modern ideal. In their portrayal of a contemporary nature as both calm and devoid of other people, they signify — in the material context of houses featuring private backyards as a locus of leisure — the *imaginary achievement* of a private leisure on a scale far grander than the backyard, for they are unfettered by the requirement of legally owning the leisure space depicted. Landscape depictions also, for many respondents, *compensate* for society, for a long, noisy commute to work, for the bustle and pressure of the world of work and so on. Abstract art, for many residents, decorates society (a basic and perennial symbol). 'Primitive' art, as found here in the homes of white liberals in segregated residential settings, is a complex sign. Among residents who view the art favourably it both gestures toward African-American culture and residents and, at the same time, distances from actual contemporary African-Americans, via the very unlikeliness of the Africans depicted in image (a component of the symbolism of African art that I had not space to develop in the discussion above). Thus 'primitive' art is also an example of an imaginary achievement. It plays out a perceived social and political obligation to integrate non-whites — African-Americans, Latinos, and others — into white households and neighbourhoods. In its ability to represent the presence of these groups in the house, and therefore also in the neighbourhood, it depicts some of the dilemmas of segregation for white liberals. Finally, art can convey symbolic meaning by its absence, indicating that the image it depicts is now seen by viewers as *incompatible* with contemporary social life. An example is the decline of depictions of the Last Supper in the kitchens and dining rooms of the Catholic working class. This is related to the decline in working-class households of the practice of several males, including boarders, eating together a meal that has doubtless been cooked by a female who is not important enough to be present.

In these, and in other ways, can emerge a semiotics of art that is properly grounded in data. The interpretations so generated will both take into account the natives' sense of the meaning/symbolism of the art, while not necessarily accepting the latter at face value.

David Halle
Director of the UCLA LeRoy Neiman Center for the Study of American Society and Culture
&
Professor of Sociology
Sociology Department
University of California
Los Angeles, CA 90095-1551
USA

Notes

1. The argument that follows has benefited from, though it does not duplicate, the excellent discussions of the relation between material artefact and cognitive representations in Renfrew (1994 and this volume) and Searle (1995; forthcoming).
2. For simplicity, I leave aside the question of whether the symbolic meanings uncovered by an outsider (MN-OUT) may also have a 'causal' impact on another artefact/symbol. The brief answer is that they might if they constitute the middle category of artefactual meanings that I referred to above (middle between MN-NAT and MN-OUT), namely those meanings of which natives are somewhat or implicitly aware but to which an outsider can draw explicit attention.
3. The terms 'tribal' and 'primitive' as applied to art are well known to be both unsatisfactory and yet hard to improve upon. I use the terms here because I am referring mostly to the audience for 'tribal' art in the West, and these are the terms that, for the most part, drove the interest of twentieth-century audiences in the artefacts.
4. On residential segregation in modern America see Massey & Denton, *Residential Apartheid* (Cambridge: Harvard University Press, 1994).
5. There are many interesting studies of abstract art which point to various aspects of the social, economic, and political context. My argument about the importance of the house and neighbourhood is compatible with acknowledging these other aspects, and indeed my argument should be viewed in that context. See, for example, Irvin Sandler, *A Triumph of American Painting* (New York: Praeger, 1970); Dore Ashton, *A New York School* (New York: Viking Press, 1973); Serge Guilbaut, *How New York Stole the Idea of Modern Art* (Chicago: University of Chicago Press, 1983); Diana Crane, *The Transformation of the Avant-Garde* (Chicago: University of Chicago Press, 1987); Stephen Polcari, *Abstract Expressionism and the Modern Experience* (New York: Cambridge University Press, 199l); Sharon Zukin, *Loft Living* (Baltimore: Johns Hopkins, 1982); Charles Simpson, *Soho: The Artist in the City* (Chicago: University of Chicago Press, 1981).

References

Ames, M., 1992. *Cannibal Tours and Glass Boxes: the Archaeology of Museums*. Vancouver: UBC Press.

Baudrillard, J., 1988. The system of objects, in *Baudrillard: Selected Writings*, ed. Mark Poster. Cambridge: Polity Press, 10–28.

Bourdieu, P., 1984. *Distinction: a Social Critique of the Judgement of Taste*. Cambridge (MA): Harvard University Press.

Clifford, J., 1988. *The Predicament of Culture*. Cambridge (MA): Harvard University Press.

Dubin, S., 1987. Symbolic slavery: black representations in popular culture. *Social Problems* 34, 122–39.

Goldwater, R., 1986. *Primitivism in Modern Art*. Cambridge (MA): Harvard University Press.

Halle, D., 1993. *Inside Culture: Art and Class in the American Home*. Chicago (IL): University of Chicago Press.

Horkheimer, M. & T. Adorno, 1972. The culture industry: enlightenment as mass deception, in *Dialectic of Enlightenment*, trans. by John Cummings. New York (NY): Herder & Herder, 120–68.

Le Corbusier, 1925. A coat of whitewash: the law of Ripolin, in *The Decorative Art Of Today*, by Le Corbusier, trans. J.I. Dunnett. London: The Architectural Press, 185–92. (Reprinted in 1987.)

Lukes, S., 1975. Political ritual and social integration. *Sociology* 9, 289–308.

Marcause, H., 1978. *The Aesthetic Dimension*. Boston (MA): Beacon Press.

Newton, D., 1978. *Masterpieces of Primitive Art*. New York (NY): Alfred Knopf.

Newton, D., J. Jones & S. Vogel, 1975. The stuff that wasn't in the Metropolitan: notes on collecting primitive art, in *The Chase, the Capture: Collecting at the Metropolitan*, ed. Thomas Hoving. New York (NY): The Metropolitan Museum of Art, 181–95.

Renfrew, C., 1994. Towards a cognitive archaeology, in *The Ancient Mind: Elements of Cognitive Archaeology*, eds. C. Renfrew & E.B.W. Zubrow. Cambridge: Cambridge University Press, 3–12.

Rubin, W., 1984. Modernist primitivism: an introduction, in *'Primitivism' in 20th-Century Art: Affinity of the Tribal and Modern*, vol. 1, ed. W. Rubin. New York (NY): The Museum of Modern Art, 1–81.

Searle, J.R., 1995. *The Construction of Social Reality*. Harmondsworth: Allen Lane.

Searle, J.R., forthcoming. *The Mystery of Consciousness*.

Stocking, G. (ed.), 1985. *Objects and Others: Essays on Museums and Material Culture*. Madison (WI): University of Wisconsin.

Vogel, S., 1988. *The Art of Collecting African Art*. New York (NY): The Center for African Art.

Chapter 5

Mimesis, Imagination and Role-play

Paul L. Harris

In the context of pretend play, young children of two- and three-years display a capacity for imaginative displacement from the here and now; an ability to bring real-world causal knowledge to bear on an imagined sequence of events; a sensitivity to the emotional implications of such events; and an ability to consider how the world appears when considered from another person's perspective. The possible evolutionary implication of this cluster of abilities is explored with respect to planning and decision-making.

One of the most interesting claims made by Merlin Donald (1991) is that a mimetic culture must have pre-dated the emergence of language in the course of human evolution. He speculates, albeit cautiously, that the prelinguistic child can offer us a contemporary analogue of this cultural mode. In this paper, I report recent findings on the normal course of mimetic development in young children. I also discuss what we can learn from those cases of psychopathology where this mimetic function has been disrupted. I argue that the developmental evidence does indeed point to an organized mode — one that includes many of the features that Donald ascribes to mimetic culture but one that also embraces various developments in decision-making and social cognition.

Mimetic development in young children

Donald (1991, 168) argues that mimesis is the ability 'to produce conscious, self-initiated, representational acts that are intentional but not linguistic'. It goes beyond mimicry and imitation because it deploys them to a higher end, namely that of 're-enacting and re-presenting an event or relationship' (1991, 169) — either for an audience or for the self.

When does this capacity appear in the course of child development and does it emerge before or alongside language? The most obvious index of mimetic capacity in young children is the ability to engage in what developmental psychologists typically call symbolic play or pretence. Simple pretend gestures start to emerge between 12 and 18 months. At first, the child tends to re-enact his or her own activities — pretending to sleep by lying on the carpet with eyes closed or drinking from an empty cup with accompanying drinking noises (Piaget 1951). From around 18 months, children begin to re-enact not just using their own body — they also animate dolls, turning them into active agents who walk, or take a bath (Nicolich 1977). Between two and three years, this role-play becomes ever more complex. Not only are characters made to interact, they are endowed with psychological states, including sensations, emotions and beliefs (Wolf *et al.* 1984). Finally, during this same period children develop the capacity to enter into joint pretence by decoding the pretend enactment of a play partner — to realize that in the context of a make-believe episode, pretend pouring from an empty vessel makes something wet, and wiping makes it dry again (Harris & Kavanaugh 1993; Harris *et al.* 1994). In short, in the course of the third year small children become playwrights who compose and act out solo or collaborative dramas.

I want to highlight four features of such pretend play: the capacity for imaginative displacement from the here and now; the ability to bring causal knowledge to bear on purely imaginary transformations; the way that self-generated imaginary inputs drive the emotional system; and the disposition to view and act on the world from a perspective other than the perspective of the self.

Displacement from the here and now

The possibility of displacement from the here and now has been taken as one of the design features of

human language (Hockett 1958). Less attention has been devoted to the cognitive machinery needed to support such displaced communication. Recent research on text processing indicates that readers build up a mental model of the scene or episode being described, a model that is appropriately updated as readers learn of further twists in the plot (Bower & Morrow 1990). At present, we know very little about the way that this modelling system develops in children. The research that I have described on the emergence of pretence, however, suggests that it begins to emerge in a rudimentary form from 12 months onward. Making this point more explicit, it is reasonable to speculate that children's pretend play must be underpinned by the cognitive ability to go beyond the props and gestures that are used to represent a pretend episode, and to imagine the episode in question — whether it is one that they enact or one that they watch enacted by a play partner. It seems likely that this same imaginative process also comes to serve children's comprehension of language. When they hear an episode described that is not currently taking place, and which they have never witnessed, they can nevertheless deploy that capacity to map from the words that they hear to a mental model that they construct in their imagination. Alternatively, when they have constructed a mental model, they can produce a verbal description.

In this connection, it is interesting to notice that children's own language gets rapidly linked to their pretend play. *A priori*, one might have supposed that children would use their speech to talk about current reality, and if not current reality, then about the actual past or the likely future. Research shows, however, that two-year-olds use language to invoke, and elaborate upon imagined possibilities and not just realities. For example, if they watch as one naughty toy animal pretends to pour tea from a teapot over another animal and are asked to describe what has happened, they describe not what they have actually seen (one animal tilting an empty teapot above another to no effect) rather they describe what they imagine to have taken place ('He tipped tea over the other one — and now the other one is all wet') (Harris & Kavanaugh 1993, experiments 6 and 7; Harris *et al.* 1994). Similarly, as they play, two- and three-year-olds often embellish the episode that they enact with a verbal commentary (Fenson 1984; Wolf *et al*. 1984).

In sum, developmental findings indicate that children have a capacity for imaginative displacement into a fictional, or make-believe episode. Between the ages of two and three years, they can map from such imaged scenarios into two different media. On the one hand, they can represent such displaced episodes via enactment, using props, dolls, and their own acting skills. On the other hand, they can also represent such episodes in words. In fact, in the context of pretend play, these two forms of mapping are often intertwined. More generally, the developmental evidence does not indicate two distinct modes developing in sequence, with the more linguistic mode building on the mimetic mode. Rather, the evidence points tentatively to a gain in imaginative capacity that promotes — more or less concurrently — two different representational skills.

Causal knowledge

When we talk about children 's imagination or fantasy, it is tempting to assume that it is a whimsical world dominated by wish-fulfilment, free association, and an absence of causal connectedness. Indeed, two of the major figures associated with theorizing about children's play and imagination — Piaget and Freud — each tend toward this view, notwithstanding other major differences between them in their theoretical focus. My own research, however, has increasingly led me to a different view. A key finding to emerge is that when children imagine a transformation in their imagination, it is disciplined by known causal constraints.

Consider once again the simple episodes that we asked children to describe. They watched as one animal 'poured' or 'squeezed' the contents of a container onto a victim. We have found that when children are prompted by a pretend enactment of this type they can work out the imaginary causal outcome. For example, children realize that a container that is tilted or squeezed in the context of pretend play will emit some of its contents, that those contents will be displaced onto an adjacent or lower surface, and that surface in its turn will end up, for the purpose of the pretend episode, 'wet', 'sticky' or 'dirty' depending on the properties of the displaced, imaginary contents. In short, children apply their causal knowledge of the world in calculating imaginary outcomes. This causal understanding can be indexed using a variety of measures. As noted earlier, children can describe the outcome in words (Harris & Kavanaugh 1993, experiments 6 & 7); they can also, if asked, point to a picture of the victim appropriately transformed by the imagined displacement (Kavanaugh & Harris 1994; Harris *et al.* in press); or they can respond with an appropriate pretend remedial gesture of their own — 'wiping' or 'drying' the surface that has been sullied (Harris & Kavanaugh 1993, experiment 5).

Similar results have emerged from a parallel set of studies on the early development of counterfactual thinking. Our technique is to describe a causal outcome in the context of a short story — typically an outcome that is untoward and undesirable. We then invite children to say why this outcome occurred. We find that even three-year-olds invoke counterfactual possibilities in explaining such negative outcomes (Harris *et al.* 1996). For example, if the child in the story is described as doing a drawing with a pen and ending up with inky fingers, three- and four-year-olds who are asked to explain what happened often comment on a causal antecedent that was not in place — but which, by implication, would have blocked the actual, undesirable outcome. For example, they point out that the story character didn't use a pencil or — more imaginatively — should have worn gloves. Once again therefore we see that young children's imaginative conjectures are causally coherent: even within their imagination, they recognize the force of actual causal powers.

All of this evidence raises the intriguing possibility that children's ability for imaginative displacement can be used in the context of thinking through and weighing up possible causal sequences. Sometimes that causal knowledge may involve the understanding of liquids, solids and gravity, as in the examples discussed above. Sometimes, it may involve the understanding of the beliefs and desires that guide the behaviour of other people. Indeed, sometimes it may involve a joint understanding of the physical and psychological domain as children imagine agents executing various plans. In short, I am proposing a capacity for displacement from the here and now that is cognitively fluid: it is informed by a variety of domains of causal knowledge (Harris 1994a; Mithen 1995).

Imagination and emotion

In describing the mimetic mode, Donald (1991) emphasizes the manifestations that we see in contemporary culture, whether in a purely mimetic, non-verbal format as in pantomime and ritual dance — or in a more hybrid form involving role enactment and language, as in theatre, opera and cinema. From a psychological point of view, it is intriguing that such fictions have a powerful ability to drive our emotional system. Indeed, we often classify artistic works in terms of the emotional impact that they have: with regard to films, for example, we readily distinguish among thrillers, horror movies, weepies, comedies, and so forth.

Children's pretend creations have a similar emotional power. For example, around three or four years of age, some children invent an imaginary creature who can evoke the same feelings of attachment and companionship as a normal friend. Children want a place reserved for the companion at the dinner table and burst into tears if the companion is 'left behind'. Similarly, having imagined a monster, robber or witch, children may start to fear the very creature that they have invented (Harris *et al.* 1991). In more extreme cases, such imaginary creatures may become a persistent source of anxiety so that children have difficulty in falling asleep and repeatedly seek reassurance from caretakers (Jersild 1943).

It seems plausible to conclude that the capacity for mimesis is intimately linked to our emotional system. Making the same point differently, the fact that a great deal of mimetic input is purely fictional does little to attenuate its emotional impact. Yet, in principle, it would seem reasonable for the human brain to reserve its emotional reactions for states of the real world. What possible evolutionary gain could there be for creatures who are moved to tears by an imaginary death, or frightened of an imaginary assailant?

One possible explanation is that emotional reactions to fiction are simply a slippage or inaccuracy in the appraisal system. In so far as mimetic displays reproduce many of the features of actual, real-life episodes, there is a simple over-generalization of the emotional reaction that would normally be elicited by a real stimulus to a mimetic or imagined stimulus. On this view, there is no particular reason to think of the emotional power of fiction as revealing anything except the emotional power of real life. This argument, however, lacks psychological plausibility. In the first place, even young children readily distinguish between fictional and real entities, so there is no inherent difficulty in marking the relevant distinction even when the two domains share particular features (Harris *et al.* 1991; Wellman & Estes 1986). Second, there is ample evidence that our cognitive machinery can deploy that distinction under other circumstances. For example, when reasoning about counterfactual premises, young children and adults recognize that any inferences that might be drawn from such premises do not amount to truths about the real world, however valid the deduction that has been made. Thus, in justifying a conclusion that follows from a counterfactual premise, children and adults refer back to the premise which they are using as a basis for their conclusion; they do not imply that the conclusion has any empirical validity in itself (Dias & Harris 1990; Scribner 1977). In other words, there is evidence that our cognitive equipment, even in childhood, can

make and sustain the distinction between an actual state of affairs and a hypothetical or imaginary state of affairs so long as we are engaged in inferential thinking. Yet that same distinction is frequently ignored in the context of emotion.

Thus, we can ask what evolutionary gain there might be in making an epistemic distinction between the actual and the imaginary, while at the same time, ignoring that same distinction at an emotional level. I return to this issue below.

Shifts of perspective

Much recent research on early cognitive development has examined the emergence of what has come to be known as a theory of mind. In one of the now classic tests of this ability, children watch as a puppet deposits some chocolate in a box and leaves the stage. In the next scene, the children watch as a second puppet surreptitiously removes the chocolate and puts it in another container. When the first puppet returns, children are asked to predict where the puppet will look for the chocolate. The developmental findings indicate a sharp increase in the ability to make this prediction accurately between three and four years. Four-year-olds typically recognize the fact that the returning puppet will have a more restricted perspective on the situation than their own, and will not take into account the transfer from the first to the second box that they witnessed. Hence, four-year-olds predict that the puppet will go to the now empty first location even though they themselves would go immediately to the second location. Three-year-olds, by contrast, frequently ignore this difference in perspective and predict that the puppet will go straightaway to the second box.

As yet, there is no consensus about the reasons for this developmental change. Some clues are offered, however, by research on individual differences. Although the shift in performance normally takes place between three and four years, children are more or less precocious within that age range. Three recent studies indicate a correlate of precocious performance: children who engage in more pretend play are likely to solve the perspective task that I have described, and variants upon it, at an earlier age than children who are restricted in their pretend play (Astington & Jenkins 1995; Taylor *et al.* 1993; Youngblade & Dunn 1995). Moreover, the available evidence suggests that it is role-play in particular, rather than pretend play in general, that is linked to perspective understanding (Harris 1994b).

These intriguing findings suggest that the capacity for imaginative displacement that I have described has major repercussions on children's social cognition, allowing them to adopt perspectives other than their own current perspective. Apparently, the mimetic mode is not just a capacity that permits imaginative enactment or re-enactment, it is linked to an increased sensitivity to variation among people in their psychological states and ensuing action.

Planning and decision-making

I have reviewed four interlinked features of the mimetic mode: the capacity for imaginative displacement from the here and now; the ability to bring causal knowledge to bear on purely imaginary transformations; the way that self-generated imaginary inputs drive the emotional system; and the disposition to view the world from a perspective other than the current perspective of the self.

What evolutionary pressures might have selected for this cluster of features? A plausible speculation advanced by Currie (1995) is that this cluster promoted the ability to plan and decide, especially in the context of risk and gain. Suppose there is a choice between two routes to a water-source. One route is shorter but it includes a section of open country; past experience has shown that attacks are more likely in the open given one's visibility to the enemy; the other route runs through the forest but it is longer. In planning how to get to the water-source, a cluster of abilities would be helpful. First, it would be useful to engage in mental displacement — to imagine the self taking each route. Second, it would be useful to imagine the causal consequences of choosing each route — visibility on the shorter route, and fatigue on the longer route. Third, it would be useful to shift to the perspective of other agents — to imagine what the enemy might do, particularly when the self is visible. Finally, in opting for one route over the other, it would be helpful to have some index of the risks associated with each. To the extent that the causal implications of each route can be imagined, and to the extent that such imagined scenarios drive the emotional system — including feelings of fear — better decision-making is likely to ensue. In sum, the cluster of features that I have described promote planning because they imply the ability to anticipate in the imagination the causal consequences of various hypothetical actions, and to consider those from the perspective of others as well as the self. They promote decision-making because they offer the planner an overall rating of each plan as indexed by the vicarious emotional state that a given plan arouses when contemplated in the imagination.

Lessons from psychopathology

As I have described it, the mimetic mode is a fairly complex package of abilities. We can imagine disturbance to its sub-components. For example, we can consider what might happen to individuals who lacked the ability for mental displacement. Alternatively, we can consider individuals whose imagination is intact but who lack the standard connection between the imagination and the emotional system. How would these individuals behave? If my argument is correct, we should expect a major departure from normal human functioning in each case. Specifically, we might expect relatively poor planning in the former case, and relatively poor decision-making in the latter case.

Two distinct pathologies provide some support for these claims. First, consider the autistic syndrome. One of the earliest indications that such children are abnormal is the absence of pretend play at around 18 months, suggesting that the capacity for mental displacement is damaged or delayed (Baron-Cohen *et al.* 1992). Later on these children perform poorly (as compared with normal and retarded controls) on tasks requiring a shift of mental perspective, as described earlier (Baron-Cohen 1995). Finally, consistent with the idea that the mimetic function is linked to planning, autistic children perform poorly on standard laboratory tests of planning, often known as executive function tasks (e.g. the Tower of Hanoi) (Harris 1993). More generally, the clinical picture of autistic people suggests that they live in a narrow temporal envelope lacking the aspirations and ambitions of normal people.

Second, we may consider recent evidence regarding patients who have sustained damage to the frontal lobe in adulthood. There is no obvious indication that they lack ambition or aspiration. Rather the clinical picture that they often present is that of being excessively, or at least recklessly, ambitious. Recent experimental work by Damasio and his colleagues helps to pinpoint the reason for this. Normal people display a marked skin conductance response not just to emotionally charged situations but to representations of such situations, for example in the form of pictures. Frontal patients, on the other hand, show such reactions only to actual stimuli and not to mere representations such as pictures (Damasio *et al.* 1991). A plausible implication of this finding is that among frontal patients the imagination does not drive the emotional system, as it does among normals. After all, the imagination can only excite the emotional system by conjuring up a representation — a mental picture or analogue of an actual situation; it cannot, of itself, generate an actual situation. Consistent with this proposal, Damasio and his colleagues found that frontal patients, unlike normals, did not show a skin conductance response when they were thinking through in their imagination a potentially risky course of action. Not surprisingly, therefore, they made many more risky decisions than normals (Bechara *et al.* 1994; 1996).

Conclusions

I have argued that the mimetic mode involves a cluster of abilities — the ability to pretend but also the ability to work out causal transformations, shift perspectives, and to feel emotion when contemplating purely hypothetical or imaginary situations. Each of these features characterizes the pretend play of young children. What are the implications of these developmental findings for the descent of humans, particularly for human immersion in culture and its artefacts? I want to stress one implication that might otherwise go unnoticed. Enduring cultural artefacts, such as writing, carving and building, clearly extend our temporal horizon: they enable us to construct a public record of the past, to look back at the past and to conceive of its continuation into the future. In this way, the present is gradually embedded into a temporal framework extending backward and forward. Certain cultural artefacts, however, offer a different type of escape from the constraints of the present — a lateral displacement rather than a stepping backward or forward. In particular, stories, symbolic props, and paintings allow us to construct a public record not just of what has actually happened but of imagined possibilities. In the context of such representations, we can embed an actual sequence of events into a set of possibilities that exist in only our imagination, but drive our emotions nevertheless. The evidence for an early mimetic mode suggests that children are rapidly attuned to this pervasive aspect of the cultural medium. In the first place, they can entertain the possible, the fictional, and even the counterfactual alongside the actual. Moreover, especially in the context of pretence, the actual sequence of events, including the gestures, props and artefacts that are used, is not interpreted solely in relation to its objective properties. Instead, the actual is interpreted, both cognitively and emotionally, in terms of imagined possibilities. Finally, children's ability to engage in shared pretence — to agree on the meaning and causal implications of their gestures and props — means that the possibilities conjured

up by one individual are understood and elaborated on by others. In this respect, mimesis is not just an individual achievement but a basis for creating collective representations.

Paul L. Harris
Department of Experimental Psychology
University of Oxford
Oxford
OX1 3UD

References

Astington, J.W. & J.M. Jenkins, 1995. Theory of mind development and social understanding. *Cognition and Emotion* 9, 151–65.

Baron-Cohen, S., 1995. *Mindblindness: an Essay on Autism and Theory of Mind*. Cambridge (MA): Bradford MIT.

Baron-Cohen, S., J. Allen & C. Gillberg, 1992. Can autism be detected at 18 months? The needle, the haystack, and the CHAT. *British Journal of Psychiatry* 161, 839–43.

Bechara, A., A.R. Damasio, H. Damasio & S. Anderson, 1994. Insensitivity to future consequences following damage to human prefrontal cortex. *Cognition* 50, 7–12.

Bechara, A., D. Tranel, H. Damasio & A.R. Damasio, 1996. Failure to respond autonomically to anticipated future outcomes following damage to prefrontal cortex. *Cerebral Cortex* 6, 215–25.

Bower, G.H. & D.G. Morrow, 1990. Mental models in narrative comprehension. *Science* 247, 44–8.

Currie, G., 1995. Imagination and simulation: aesthetics meets cognitive science, in *Mental Simulation*, eds. M. Davies & T. Stone. Oxford: Blackwell, 151–69.

Damasio, A.R., D. Tranel & H. Damasio, 1991. Somatic markers and the guidance of behavior: theory and preliminary testing, in *Frontal Lobe Function and Dysfunction*, eds. H.S. Levin, H.M. Eisenberg & A.L. Benton. New York (NY): Oxford University Press, 217–29.

Dias, M. & P.L. Harris, 1990. The influence of the imagination on reasoning by young children. *British Journal of Developmental Psychology* 8, 305–18.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Fenson, L., 1984. Developmental trends for action and speech in pretend play, in *Symbolic Play: the Development of Social Understanding*, ed. I. Bretherton. Orlando (FL): Academic Press, 249–70.

Harris, P.L., 1993. Pretending and planning, in *Understanding Other Minds: Perspectives from Autism*, eds. S. Baron-Cohen, H. Tager-Flusberg & D. Cohen. Oxford: Oxford University Press, 228–46.

Harris, P.L., 1994a. Thinking by children and scientists: false analogies and neglected similarities, in *Mapping the Mind: Domain Specificity in Cognition and Culture*, eds. L.A. Hirschfeld & S.A. Gelman. New York: Cambridge University Press, 294–315.

Harris, P.L., 1994b. The child's understanding of emotion: developmental change and the family environment. *Journal of Child Psychology and Psychiatry* 35, 3–28.

Harris, P.L. & R.D. Kavanaugh, 1993. Young children's understanding of pretense. *Society for Research in Child Development Monographs* 231, 58, 1.

Harris, P.L., E. Brown, C. Marriott, S. Whittall & S. Harmer, 1991. Monsters, ghosts and witches: testing the limits of the fantasy–reality distinction in young children. *British Journal of Developmental Psychology* 9, 105–23.

Harris, P.L., R.D. Kavanaugh & M. Meredith, 1994. Young children's comprehension of pretend episodes: the integration of successive actions. *Child Development* 65, 16–30.

Harris, P.L., T. German & P. Mills, 1996. Children's use of counterfactual thinking in causal reasoning. *Cognition* 62, 233–59.

Harris, P.L., R.D. Kavanaugh & L. Dowson, in press. The depiction of imaginary transformations: early comprehension of a symbolic function. *Cognitive Development*.

Hockett, C.F., 1958. *A Course in Modern Linguistics*. New York (NY): MacMillan.

Jersild, A.T., 1943. Studies of children's fears, in *Child Behavior and Development*, eds. R.G. Barker, J.S. Kounin & H.F. Wright. New York (NY): McGraw-Hill.

Kavanaugh, R.D. & P.L. Harris, 1994. Imagining the outcome of pretend transformations: assessing the competence of normal children and children with autism. *Developmental Psychology* 30, 847–54.

Mithen, S., 1995. Understanding mind and culture: evolutionary psychology or social anthropology? *Anthropology Today* 11, 3–7.

Nicolich, L., 1977. Beyond sensorimotor intelligence: assessment of symbolic maturity through analysis of pretend play. *Merrill-Palmer Quarterly* 23, 89–99.

Piaget, J., 1951. *Play, Dreams and Imitation*. London: Heinemann.

Scribner, S., 1977. Modes of thinking and ways of speaking: culture and logic reconsidered, in *Thinking*, eds. P.N. Johnson & P.C. Wason. New York (NY): Cambridge University Press, 483–500.

Taylor, M., L.E. Gerow & S.M. Carlson, 1993. The relation between individual differences in fantasy and theory of mind, in J. Woolley (Chair), Pretense, imagination and the child 's theory of mind. Symposium presented at the biennial meeting of the Society for Research in Child Development, New Orleans, March.

Wellman, H.M. & D. Estes, 1986. Early understanding of mental entities: a reexamination of childhood realism. *Child Development* 57, 910–23.

Wolf, D.P., J. Rygh & J. Altshuler, 1984. Agency and experience: actions and states in play narratives, in *Symbolic Play: the Development of Social Understanding*, ed. I. Bretherton. Orlando (FL): Academic Press, 195–217.

Youngblade, L.M. & J. Dunn, 1995. Individual differences in young children's pretend play with mother and sibling: links to relationships and understanding of other people's feelings and beliefs. *Child Development* 66, 1472–92.

Chapter 6

Rock Art: Handmaiden to Studies of Cognitive Evolution

Thomas A. Dowson

Rock art, particularly European Palaeolithic cave art, is perceived in both popular and academic contexts as the origins of art. Consequently rock art becomes a handmaiden to evolutionary perspectives on human cognition. This position tends to promote naïve interpretations of the imagery, which are based on a number of empirical misrepresentations and certain logical problems. By addressing these issues, in essence theorizing the art, the interpretative potential of this imagery becomes more apparent. Palaeolithic images represented material and non-material resources that were actively negotiated in day-to-day social relations. They thus provide evidence for specific social practices of real prehistoric people.

Merlin Donald's book *Origins of the Modern Mind* proposes 'three stages in the evolution of culture and cognition'. These are, first, the development of mimetic skills; second, lexical inventions; and finally, the externalization of memory. It is this final stage that interests a rock art researcher such as myself.

The externalization of memory, according to Donald, relies on a

> *visuosymbolic invention, which advanced through various well-documented stages*, culminating in a variety of complex graphic and numerical conventions and writing systems. The second was *external memory*, which evolved to the point where external memory records, mediated by a 'literate' class, started to play a governing role. The third was the emergence of very large, externally nested cultural products called *theories*. (Donald 1993, 745)

Cave art was the first of those 'well-documented stages' that provides evidence for the origins of the externalization of memory.

Interesting and original as Donald's ideas may be for those interested in the evolution of cognition, I take this opportunity to explore the place of rock art in our understanding of human cognition. Rock art, particularly European Palaeolithic cave art, has long been perceived as the origins of information storage.

But why?

That question is not as trivial as it might at first seem. I argue that the idea that cave art represents the 'earliest form of notation' greatly limits the interpretation of rock art worldwide. In this paper I explore why it is that European Palaeolithic cave art is persistently referred to as the origins of art, and/or the origins of information storage; and how it is that this perception forces us to think about Palaeolithic art in certain ways — ways that draw on both a flawed methodology, and empirical misrepresentations of the art. In briefly outlining an alternative interpretation, we are forced to think about early artistic traditions and human cognition in strikingly different ways.

Why?

In 1673 a Jesuit missionary made what is generally accepted to be the first written account of images painted onto or engraved into a rock surface — images that we now call *rock art*. From the 1600s literate traders and missionaries were travelling to remote and for them particularly hostile regions of the world. As educated explorers these people maintained detailed journals of their journeys. And it was on one

such journey that Father Jacques Marquette was drifting down the Mississippi River when he passed through an area of limestone bluffs. On these surfaces he saw what he described as an enormous and frightening animal that he thought of as a great dragon-like cat with deer antlers. So began the West's strange fascination with rock art.

For centuries thereafter countless travellers, missionaries and early colonists would come upon images on the rocks of landscapes they were reshaping in so many different ways. Many of them would write about these images. Today their words are a stark and often shocking reminder of the insidious colonial processes indigenous peoples around the world have had to endure. For Father Marquette the composite animal with the head of a cat, and a mask showing a human face with antlers, would have provided powerful proof of the kinds of demonic spirits he and his European contemporaries believed indigenous peoples worshipped.

Some Europeans simply did not believe indigenous peoples could have executed such unequivocally beautiful and evocative imagery. In an account of travels during 1797 and 1798 into the southern African interior, then largely unexplored by Europeans, Sir John Barrow wrote: 'The force and spirit of drawings, given to them by bold touches judiciously applied, and by the effect of light and shadow, could not be expected from savages' (1801, 237). It is sadly ironic that rock art, in its early years of European discovery, merely served to reinforce Eurocentric attitudes of religious superiority and intolerance. But these attitudes were not only reserved for non-Europeans.

Just over two hundred years after the Jesuit's startling observation on the Mississippi, a Spanish nobleman was excavating in a cave called Altamira. He had just seen an exhibition in Paris of carved bone and antler from the Upper Palaeolithic. Don Marcelino de Sautuola was determined to find similar examples of mobiliary art in the cave on his estate. While he was busy excavating, his daughter Maria wandered off into other parts of the cave, and it was she who found paintings of bison and other wild animals on the ceiling of that cave. De Sautuola's announcement of the find in 1860 was greeted with extreme and vicious scepticism — the paintings were thought to be forgeries. At that time it was impossible for Europe to accept that primitive Palaeolithic people could have executed such magnificent paintings. Such an acceptance would certainly have challenged Europe's cultural superiority.

It was not long before rock art was being found in other caves in France and Spain; and these discoveries challenged the view that the paintings in Altamira were forgeries. At a French site called La Mouthe, for instance, both rock paintings and rock engravings were found inside a cave that had been sealed since Palaeolithic times. These depictions could not have been executed more recently. It was in the light of such evidence that the authenticity and the antiquity of this art soon came to be accepted.

Refusal to accept rock art as the work of prehistoric hunter-gatherers is a position many writers the world over have adopted. During the decades after the images in Altamira came to light and after they became accepted as prehistoric, the most fanciful ideas were penned to ensure European superiority. The idea of artists from Outer Space, perhaps more intelligent even than Europeans, has often been more palatable than that of so-called primitive artists. But even though such outrageous ideas are no longer seriously entertained today, popular interest and the academic study of rock art is still used to bolster European superiority.

A moments reflection on the media attention that followed the recent 'discovery' of Chauvet and Cosquer caves in France reveals the power that Palaeolithic cave art possesses in capturing the imagination of a wide and popular audience. The findings from Chauvet Cave are particularly important as the radiocarbon dates obtained from certain images suggest that this 'style' of Palaeolithic art is much older than initially thought (Clottes 1996). The finding has prompted a flurry of renewed popular interest in the origins of art. The media-hype raises two significant points.

First, it is still generally believed that there was one point in time when one of our distant, indeed very distant, ancestors made a mark of some kind, and that that mark led to the variety of artistic traditions we have today. The idea that there were many, quite independent traditions of image-making around the globe thousands of years ago that have no bearing on contemporary artistic traditions is not one that produces sensational newspaper or magazine articles.

The second point, leading directly from the first, is that the Palaeolithic cave art of Europe is still accepted as 'the' origin of art. The antiquity of cave art, its geographic location in *western* Europe, and its unquestioned aesthetic qualities make Palaeolithic cave art a seemingly obvious candidate for the beginnings of the great artistic traditions of the West. This echoes the once widespread view that Western

history is often regarded as the history of humanity (Gellner 1964, 12).

It is not surprising that the caves, particularly Lascaux, provide places to which academics, artists and tourists alike make both intellectual and physical pilgrimages. The tourist and education industries associated with these caves in France are well set up to promote a Francocentric history of art, with competition only from Spain and the Altamira cave. The book 'From Lascaux to the Louvre' with a foreword by Francois Mitterrand completes a powerful nationalist message.

These two related views result from an old but persistent assumption that culturally modern *Homo sapien sapiens* developed in Europe and then colonized the globe. More and more research, however, has revealed that biologically modern humans developed long before the earliest date for Palaeolithic cave art, and in places other than western Europe. It is not just a possibility but a certainty that all sorts of creative traditions developed around the world quite independently of, and in some cases even earlier than, those in Europe. But this certainty is overlooked. Contemporary, popular representations of Palaeolithic cave art still stand for the emergence of modern humans as we know them. Reproductions of images from Lascaux and Chauvet, that shout out from the covers of *Time International* and other popular journals, declare these as images made by people, not apes and monkeys. It becomes very difficult, then, to divorce these images from discussions about the origins of image-making, symbolic behaviour and art; particularly for those wedded to evolutionary approaches to human cognition and culture.

Functionalist interpretations

Numerous writers have argued extensively that rock art records astrological and seasonal observations (for example Marshack 1990; 1991); or that it facilitated the exchange of information that allows for the development of social interaction, or the creation and maintenance of social networks (for example, Conkey 1978; Gamble 1982; 1991; Jochim 1983; 1987); or that it depicts hunting techniques and other information associated with the location and condition of potential resources (for example, Mithen 1988; 1989; 1991). In these studies the production of rock art imagery is assumed, either explicitly or more implicitly, to be an adaptive process facilitating the storage and communication of vital information. But this information always appears to be practical in nature and one is left with the impression that the often vast painted and engraved panels are nothing more than a kind of manual on how to be a happy Palaeolithic hunter, and, in some cases, a dutiful Palaeolithic gatherer.

Because cave art is seen as the starting point of a developmental progression towards a complex range of representational devices, the message the images convey can only be simple and practical. The 'primitive' stereotype despite regular protestations never disappears; its merely becomes less explicit. In *The Cambridge Encyclopedia of Human Evolution*, for example, Stringer (1992, 249) writes:

> One of the most remarkable abilities of the Cro-Magnons was in the production of engravings and sculptures. These were part of a whole range of artistic expression that appears after about 35,000 years in Europe, and which reached its heights on the painted walls and ceilings of caves such as Lascaux and Altamira.

But is it so remarkable? The reason why some find it remarkable that Cro-Magnons made art results from their thinking about Cro-Magnons in ways similar to those of Barrow and other early European colonists thinking about Bushman people of southern Africa. As primitive ancestors, this remarkable art could not have been all that complex. Later in the volume, in a entry entitled 'The hominid way of life', Potts (1992, 329) writes, 'the blossoming of symbolic expression portrayed on cave walls, in rockshelters and by carved figurines starting 30,000 years ago shows that novel modes of information transfer encouraged innovation'. The interpretations that follow these sort of off-the-cuff remarks, at both popular and academic levels, are extremely limited and almost invariably centre on the images depicting observations of daily life (see, from the same encyclopedia, van der Merwe 1992, 370). The idea that rock art images are passive, external memory records of one sort or another requires critical examination.

In a number of papers Mithen (1988; 1989; 1991), for example, has argued for placing Upper Palaeolithic cave art within an 'ecological context'. Because modern hunter-gatherers are keen observers of their environment, and because tracks, hoofprints, faeces, etc., are depicted, Mithen believes the art relates to information about the location, state and procurement of potential resources. There are at least two methodological problems here.

The first relates specifically to Mithen's approach where he induces meaning from the images. Hunter-gatherers are

> alert to signs of plants or animals which may be of

> use to the other sex. At the camp the women will tell the men about any tracks or game signs they have seen and the men inform the women concerning available plant resources (e.g. Draper 1976, 216; Silberbauer 1981, 201, 237–8). Due to the ubiquity of information gathering there can be little doubt that this was used by Upper Palaeolithic hunter gatherers . . . a record of such activity is present in their art. (Mithen 1988, 297–8)

Because Kalahari Bushman people carefully observe the environment within which they live, it does not follow that any Palaeolithic depictions of animal features or behavioural characteristics is recording that as information, a passive record, for others to see. The Bushman people, for instance, use aspects of animal behaviour as metaphors for religious beliefs and experiences (see Lewis-Williams & Loubser 1986; Dowson 1988). Mithen is projecting an ecological interpretation of an ethnographic present onto Palaeolithic art.

The second methodological problem is perhaps more damaging and is shared by most if not all functionalist approaches. Functionalist interpretations are fundamentally flawed because of their teleological nature. The consequence of producing these images, which allowed Palaeolithic communities to 'adapt' to their environment, cannot account for making the images in the first place. Some writers attempt to downplay the teleology of their argument by stressing they are not dealing with the origins of the art (Gamble 1991, 3; Mithen 1991, 104). But caveats such as these do not eliminate the logical problems of the explanations. An explanation for the origins of and motivation for image-making needs to be forthcoming. And that explanation needs to explain how making the art facilitates the kinds of consequences functionalists believe the art to have had for Palaeolithic communities. Simply, albeit explicitly, ignoring the source of logical problems, in this case origins, does not result in the resolution of such problems.

Besides these methodological problems there are a number of empirical issues that require closer attention. While some of the numerous paintings and engravings obviously do depict observations anyone could make on a daily basis, prominent features of Palaeolithic cave art are simply overlooked when thinking of the art as an aid to the storage of information. As Halverson (1993, 762) points out in his comment on Donald's book, 'In the few pages discussing Palaeolithic art (pp. 279–84) there is hardly a sentence that is not dubious or merely wrong.'

The most significant feature of the art that is overlooked by functionalist approaches is the physical space within which these images were placed and subsequently consumed. The rock shelter or cave setting does not require explanation, because of the die-hard, albeit implicit, primitive perceptions we have about hunter-gatherers. Similarly, the setting does not add to the interpretation of the image. In fact the setting is something we rarely see in publications. What we are presented with are photographs or drawings of the panels.

One such drawing from 'The Great Ceiling' in Rouffignac is a case in point. Today we are able to reach the panel on a miniature train, which takes about forty minutes. The panel is painted on the ceiling of what was once a low passage. We get a good view of the panel because the deposit has been considerably excavated. We have the assistance of reliable flashlights and electric lights. Not only is it easy for us to stand back and take it all in, but the panel has been painstakingly reproduced, allowing us to carry away a 'reliable' copy (reproduced here in Fig. 6.1). These factors necessarily influence the way we see these images. We are surely seeing them in an entirely different way from the original producers and consumers.

This ceiling panel is in a part of the cave which the original producers and viewers would, in places, have had to crawl on their hands, knees and stomachs for hours to reach. Once beneath the painted ceiling, they did not have the benefit of the excavated floor — they were only ever between two and three feet away from the rock face. They had relatively unreliable tallow lamps. They would never have been able physically to experience the panel in its entirety as we can today.

The example of this particular panel is quite straight forward; about sixty animals painted on the roof of the cave. In other caves images are painted or engraved in small side chambers, in some cases only a metre in diameter, and room enough for one person. Inside these chambers, reached by chimney-like tunnels, are two or three depictions of animals.

Other Palaeolithic artists made use of natural features on the walls and ceilings of these underground cave systems. At Bernifal, for example, an eye and a nostril have been added to a natural protrusion of rock to reproduce a human face (Fig. 6.2). Numerous and diverse examples where artists have made deliberate and interesting use of the rock face are in fact being noticed and reported. Artists, and obviously viewers, also frequently used a technique of casting shadows to enhance the process of 'simply' seeing an image (Freeman *et al.* 1987, 105).

Figure 6.1. *A reproduction of the ceiling panel from Rouffignac. (After Barriere 1982.)*

'Images' like these are often very difficult to find. And obviously, such techniques draw on an intentional desire that did not distinguish between the image and the support; a distinction that is highlighted in Western, formalist approaches to art. Indeed, functionalist approaches to Palaeolithic cave art have relied solely on a Western, post-enlightenment appreciation of art.

It is much easier to see these large panels having a didactic function when looking at clean, easy-to-read copies in the warmth of one's armchair. But, having crawled down some of these passages with hardly any light, spent a considerable amount of time locating and looking for the images, I find it difficult to see how they 'enabled rapid information recall' (Mithen 1989, 692). An approach that ignores the physical experience of looking at the images, an experience that played on intense exploration and ambiguity, merely misrepresents the art. Such misrepresentation results in the kind of monolithic perception of 'Palaeolithic art' that Conkey (1987) suggests we avoid.

Besides this monolithic understanding of an incredibly diverse artistic tradition(s), these functionalist explanations deny the images their own reality. One of the central tenets of the functionalist approach is to devise at the outset a context within which 'the art' is to be examined. The context is taken to be the set of ecological parameters within which the art was located, or a series of archaeological features with which the art is associated. This context then explains the art. In fact, Mithen (1991, 113–14) finds it

> impossible to separate the notions of human adaptation and creativity since they are dependent upon each other. I am left wondering about a possible connection between the creative act of producing images and the creative thoughts about hunting behaviour such images helped generate. I feel that these must have fed off each other in a spiral of creativity leaving us today with the splendours of Palaeolithic art and enabling the Palaeolithic hunters to adapts to their uncertain world. (Mithen 1991, 113–14)

Gamble's approach is more subtle, but no less problematic.

Figure 6.2. *Below the outline of a mammoth, an eye and nostril were added to a natural feature on the wall of the cave (Bernifal) to give the impression of a human face.*

> In placing the art in different contexts of long-term survival — open, refuge and expansion — I have grounded the discussion of its diversity in ecological variables so that instead of arguing about intention, motive or the meaning of art we can look at its variable role in survival and negotiation. (Gamble 1991, 12)

But, as Lewis-Williams points out, contexts are

> not 'given' as the illusion of positivist archaeology suggests. All contexts are assemblages of selected features; they are value-laden constructs made by archaeologists acting in specific social circumstances. Archaeologists decide which features of the past shall be deemed the context of the art. We cannot, however, know what constitutes the informing context of the art, as distinct from a vague background, until we know something about its 'meaning' and social role. If we try to formulate the informing context of the art before we know its 'meaning' and social role, we shall simply be placing constraints on the type of explanation. (Lewis-Williams 1990, 133)

Mithen's 'ecological context', with particular reference to hunting activities, results in an ecological and adaptational explanation for Palaeolithic imagery that is overtly masculist. By examining the art in the context of archaeologically observed shifts in demography, Gamble also produces an adaptationist understanding as those demographic shifts are thought to be influenced by ecological constraints. Palaeolithic art, then, simply facilitated strategies for survival.

Approaches like these predetermine the legitimacy of the imagery. Because Palaeolithic images are assumed at the outset to be early and primitive forms of information exchange, they are nothing more than handmaidens to an evolutionary perspective of prehistory. Prehistory of this sort tends to be what Gellner (1964, 12) calls a 'world growth story'. Making art is just another one of those strategies prehistoric hunter-gatherers (usually only the hunters though) adopt to ensure survival.

But there is no need to look at the lives of hunter-gatherers or their art in this functionalist way. Hunter-gatherer art, past or present, is an integral part of the socio-political milieu of the community in which it was produced and experienced (Dowson in press). This view begins by exploring the meaning and social role of the imagery; an exploration that must take place at both local and regional levels. Attempting to understand the meaning and motivation is not as futile as Gamble implies. By theorizing the meaning and social role of hunter-gatherer art, we are able to construct an informing context, and hence understand its role in negotiating social interaction.

Theorizing Palaeolithic images

Over the last decade or so the shamanistic interpretation of Palaeolithic imagery has developed considerably. Shamanism has often been used to explain Palaeolithic cave art, but in a slight and uncritical manner. In 1988 two papers initiated a more methodologically rigorous attempt at developing this line of enquiry. One attempted to find a link, based on bird ethology, between the human figure and the 'bird on the staff' image from the shaft of Lascaux (Davenport & Jochim 1988). The other explored a neuropsychological link between visions seen in an altered state of consciousness and Palaeolithic images (Lewis-Williams & Dowson 1988). Having established a neuropsychological bridge between modern experiences in altered states of conscious-

ness and Palaeolithic imagery with strong relations of relevance, Lewis-Williams has gone on to develop a shamanistic interpretation that has more explanatory power and potential than any other explanation on offer (Lewis-Williams 1991; 1994; 1997a,b; Clottes & Lewis-Williams 1996).

As with any interpretative enterprise in archaeology, the shamanistic approach is not without problems. But for the purposes of this piece, those problems do not include the teleology inherent in the functionalist approaches I have already discussed. In fact the neuropsychological strand of evidence can explain how it is that two-dimensional marks came to represent three-dimensional objects. The answer lies in the way in which visual hallucinations are perceived in altered states of consciousness.

Numerous reports suggest that visual hallucinations and afterimages, which may recur much later, are projected onto plane surfaces. Similarly, the neuropsychological bridge allows us to infer that early Palaeolithic artists experiencing an altered state of consciousness would also have 'seen' mental images and after-images projected onto their surroundings. As a result of experiences in altered states, their lives would have already been invested with images. There was thus no need to invent them intellectually. Tracing projected mental imagery with a stick in the sand or on a soft wall in a cave would have 'fixed' them, enabling them to be experienced again and again by subsequent viewers. We do not need to resort to complex hypotheses and explanations of how three-dimensional objects came to be represented in two dimensions. Palaeolithic images resulted from a 'fixing' of existing mental imagery. The representation of visual hallucinations provided a 'physical reality' of personal (spiritual) experiences to be shared and manipulated.

As the making of these images developed, so too the processes of making and the experiences of seeing these images added to individuals' perceptions of a supernatural reality. We know that not all paintings were applied with a brush. In certain cases pigment was blown onto the rock surface. Some of these pigments contained manganese oxides. In attempting to replicate some of the paintings Lorblanchet was advised against using pigments containing manganese oxide (1995, 218), as this would lead to managanese poisoning. He was informed that this would result in severe psychiatric disorders, including hallucinations.

The medical literature indicates that the side-effects of manganese toxicity are well known. Manganese intoxication was first described in 1837 (Cook *et al.* 1974, 59), and has since been the subject of many medical reports (see, for example, Abd el Naby & Hassanein 1965; Mena *et al.* 1967). Those coming into contact (e.g. through inhalation) with manganese develop severe psychiatric and neurological symptoms. Patients become extremely excited, agitated and even deluded. They also report hallucinations.

It is not, then, mere speculation that some artists at least would have experienced hallucinations while blowing pigments onto the rock. This would not only have produced 'new' floating images, but would also have influenced perception of the rock surface itself. Numerous accounts of visual hallucinations experienced under laboratory conditions mention a change in visual depth relations and a magnification of detail on surrounding objects (Cohen 1964, 133; Kluver 1966; Keiffer & Moritz 1968). With such visual effects the rock face would not have been perceived as a static surface. Natural features would have presented visual opportunities for graphic manipulation (as in Fig. 6.2). Lewis-Williams (1997b, 333) suggests the rock face should be thought of as a 'membrane' between the real world and a spirit world.

Such beliefs were, in all probability, widely held, given the widespread yet diverse use and manipulation of natural features on the cave walls. Interpretations that identify images with visual hallucinations are more general in character. But the explanatory power of the shamanistic approach is seen in the way in which individual images can be explained more fully in specific terms. This avoids the criticism that the construction of Palaeolithic shamanism is nothing more than a grand, monolithic social institution, and hence has no real meaning or value at all.

The potential of the shamanistic approach can be demonstrated from a well-known example from Pech-Merle, the 'spotted' horses. Lorblanchet (1995, 210–16) has suggested that the panel was produced in four stages. Briefly, the outline of the two horses was followed by six negative hand stencils, then clouds and rows of blown dots, and finally a red fish, red dots and finger stencils were added (Fig. 6.3).

Interestingly, the head of one of the horses is suggested by a natural edge of the flat surface on which the paintings were executed. While blowing the outline of the horses or the hand stencils with pigments containing manganese, it is not outrageous to suggest that the artist(s) began to experience visual hallucinations; perhaps the entoptic dots that were subsequently added. But the surface of the rock with the suggestive horse's head would also have

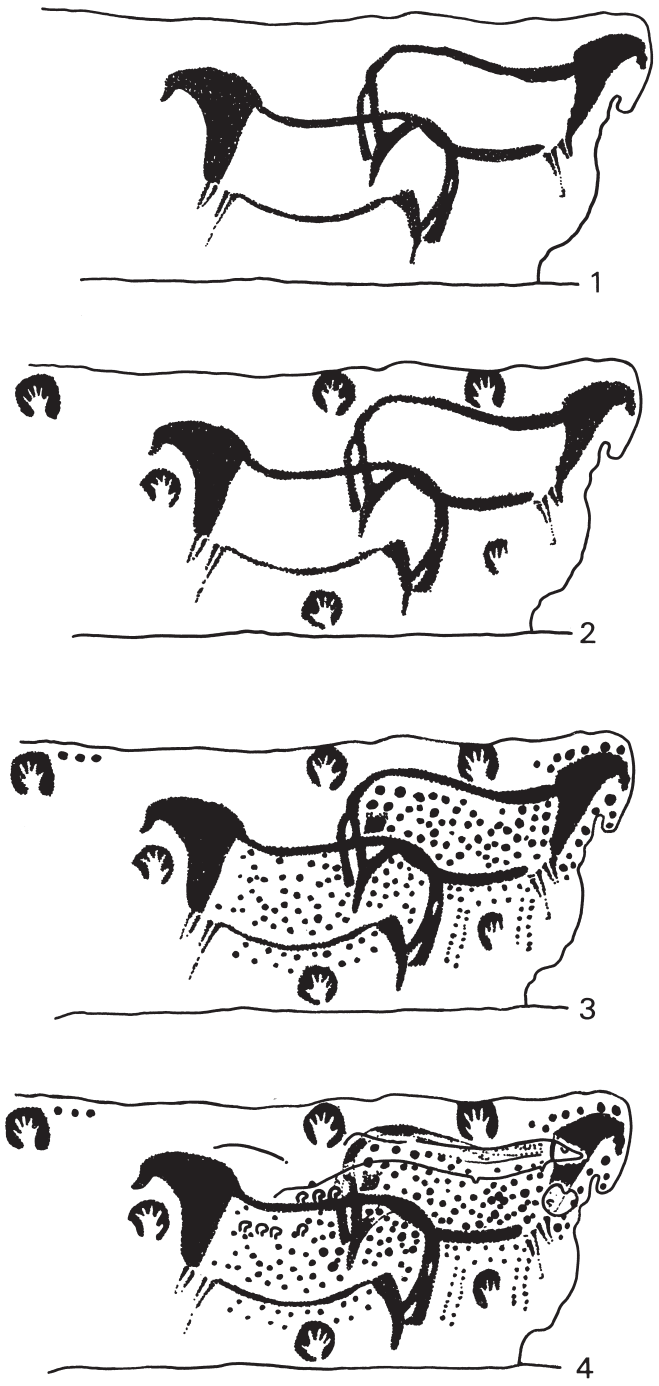


Figure 6.3. *The four episodes of 'painting' activity that produced the 'spotted horses panel' in Pech-Merle. (Adapted from Lorblanchet 1995, 212–13.)*

come alive, imparting an incontrovertible reality to the painted image. The fish could easily represent in a graphic manner experiences people all over the world liken to being under water. Rather than simply identifying the spotted horses as a representation of a complex, stage three hallucination, by focusing on the physical processes of making and 'seeing' the image, we are able to demonstrate a specific link between this painted image and the spiritual experience from which it was derived.

The uniqueness and apparent simplicity of this panel leads me to think it was the revelation of an individual 'shaman'. We are, then, able to learn something of the apparatus of shamanic representation that gave this unique image the active part it played in negotiating the social role of the shaman with which it was associated. In painting such a strikingly original panel the shaman was negotiating a specific, personal relationship with the spirit world. This intimate spiritual relationship would certainly have influenced that person's identity in the 'real' world (cf. Dowson 1998). By extending the study of this image to include the general topography of Pech-Merle and other painted panels, as well as other sites in the Quercy area, a fuller appreciation of this person's role in his or her community will be possible.

In the same region, Lewis-Williams (1997a) considers another distinctive motif, the so-called 'wounded man'. By examining the details of this rare motif in terms of specific experiences in altered states of consciousness, and other more abundant imagery, Lewis-Williams argues that these human figures represented a challenge to a hegemony negotiated by a more dominant representational system.

These unique examples from Quercy represent distinct social processes. Through the non-material and material production of alternative images, marginalized or disenfranchised shamans, manipulating the apparatus of shamanic representation, negotiated specific personal identities. These images empowered them to advance their own spiritual and political interests and hence produce some degree of social visibility.

Mapping the details of specific spiritual experiences on a microscale, in the ways suggested by the Quercy examples, provides evidence for the specific social practices of real prehistoric agents, rather than a record of abstract social roles and institutions where history appears as a by-product. By theorizing the art at this local level we construct its religious and political significance. In so doing, we set out to make Palaeolithic history (cf. Barret 1987).

By exploring and further developing this religious and political interpretation of Palaeolithic art it becomes increasingly difficult to see how the making of these images facilitated the exchange of

information as part of strategies for survival. Palaeolithic cave art does not represent simple forms of information exchange that constitute the early stages of an evolutionary trend ending in complex theories. On the contrary, the images represented material and non-material resources actively negotiated in day-to-day social relations. In releasing cave art from a position of intellectual servitude, recent interpretative directions in the study of rock art worldwide present a powerful challenge to the persistent evolutionary and androcentric perspectives on human cognition and art.

Thomas A. Dowson
Department of Archaeology
University of Southampton
Southampton
SO17 1BJ

References

Abd el Naby, S. & M. Hassanein, 1965. Neuropsychiatric manifestations of chronic manganese poisoning. *Journal of Neurology, Neurosurgery and Psychiatry* 28, 282–7.

Barrett, J.C., 1987. Fields of discourse: reconstituting a social archaeology. *Critique of Anthropology* 7(3), 5–16.

Barriere, C., 1982. *L'Art parietal de Rouffignac*. Paris: Picard.

Barrow, J., 1801. *An Account of his Travels into the Interior of Southern Africa in the Years 1797 and 1798*, vol. 1. London: Cadell & Davis.

Clottes, J., 1996. Thematic changes in Upper Palaeolithic art: a view from Grotte Chauvet. *Antiquity* 70, 276–88.

Clottes, J. & J.D. Lewis-Williams, 1996. *Les Chamanes de la Prehistoire: transe et magie dans les grottes ornees*. Paris: Seuil.

Cohen, S., 1964. *The Beyond Within: the LSD Story*. New York (NY): Atheneum.

Conkey, M.W., 1978. Style and information in cultural evolution, in *Advances in Archaeology*, ed. M. Schiffer. New York (NY): Academic Press, 61–85.

Conkey, M.W., 1987. New approaches in the search for meaning? A review of research in 'Palaeolithic Art'. *Journal of Field Archaeology* 14, 413–30.

Cook, D., S. Fahn & K. Brait. 1974. Chronic manganese intoxication. *Archives of Neurology* 30, 59–63.

Davenport, D. & M.A. Jochim, 1988. The scene in the shaft at Lascaux. *Antiquity* 62, 558–62.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Donald, M., 1993. Precis of *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. *Behavioural and Brain Sciences* 16(4), 737–91.

Dowson, T.A., 1988. Revelations of religious reality: the individual in San rock art. *World Archaeology* 20, 116–28.

Dowson, T.A., 1998. Like people in prehistory. *World Archaeology* 29(3), 333–43.

Dowson, T.A., in press. Painting as politics: exposing historical processes in hunter-gatherer rock art, in *Hunters and Gatherers in the Modern World: Conflict, Resistance, and Self -determination*, eds. M. Biesele, R. Hitchcock & P. Schweitzer. Providence: Berghahn Books.

Freeman, D., J.G. Echegerey, F. Bernaldo de Quiros & J. Ogden, 1987. *Altimira Revisited and Other Essays on Early Art*. Chicago (IL): Institute for Prehistoric Investigations.

Gamble, C., 1982. Interaction and alliance in Palaeolithic society. *Man* 17, 92–107.

Gamble, C., 1991. The social context for European Palaeolithic art. *Proceedings of the Prehistoric Society* 57(1), 3–15.

Gellner, E., 1964. *Thought and Change*. London: Weidenfeld & Nicolson.

Halverson, J., 1993. Mythos and logos: comment on Donald, 1993. *Behavioural and Brain Sciences* 16(4), 762.

Jochim, M., 1983. Palaeolithic cave art in ecological perspective, in *Hunter-gatherer Economy in Prehistory*, ed. G. Bailey. Cambridge: Cambridge University Press, 212–19.

Jochim, M., 1987. Late Pleistocene refugia in Europe, in *The Pleistocene Old World*, ed. O. Soffer. New York (NY): Plenum Press, 365–75.

Jones, S., R. Martin & D. Pilbeam (eds.), 1992. *The Cambridge Encyclopedia of Human Evolution*. Cambridge: Cambridge University Press.

Keiffer, S.N. & T.B. Moritz, 1968. Psychedelic drugs. *Pennsylvannia Medicine* 71, 57–67.

Kluver, H., 1966. *Mescal and Mechanisms of Hallucinations*. Chicago (IL): Chicago University Press.

Lewis-Williams, J.D., 1990. Documentation, analysis and interpretation: dilemmas in rock art research. *South African Archaeological Bulletin* 45, 126–36.

Lewis-Williams, J.D., 1991. Wrestling with analogy: a problem in Upper Palaeolithic art research. *Proceedings of the Prehistoric Society* 57(1), 149–62.

Lewis-Williams, J.D., 1994. Rock art and ritual: southern Africa and beyond. *Complutum* 5, 277–89.

Lewis-Williams, J.D., 1997a. Agency, art and altered states of consciousness: a motif in French (Quercy) Upper Palaeolithic parietal art. *Antiquity* 71, 810–30.

Lewis-Williams, J.D., 1997b. Harnessing the brain: vision and shamanism in Upper Paleolithic western Europe, in *Beyond Art: Pleistocene Image and Symbol*, eds. M. Conkey, O. Soffer, D. Stratmann & N.G. Jablonski. (Memoirs 23.) San Francisco (CA): California Academy of Sciences, 321–42.

Lewis-Williams, J.D. & T.A. Dowson, 1988. The signs of all times: entoptic phenomena in Upper Palaeolithic Art. *Current Anthropology* 29, 201–45.

Lewis-Williams, J.D. & J.H.N. Loubser, 1986. Deceptive appearances: a critique of southern African rock art studies. *Advances in World Archaeology* 5, 253–89.

Lorblanchet, M., 1995. *Les grottes ornees de la prehistoire: nouveaux regards*. Paris: Editions Errance.

Marshack, A., 1990. The Taï Plaque and calendrical notation in the Upper Palaeolithic. *Cambridge Archaeological Journal* 1(1), 25–61.

Marshack, A., 1991. *Roots of Civilization: the Cognitive Beginnings of Man's First Art, Symbol and Notation*. 2nd edition. New York (NY): Moyer Bell.

Mena, I., O. Marin, S. Fuenzalida & G. Cotzias, 1967. Chronic manganese poisoning. *Neurology* 17, 128–36.

Mithen, S.J., 1988. Looking and learning: Upper Palaeolithic art and information gathering. *World Archaeology* 19(3), 297–327.

Mithen, S.J., 1989. To hunt or to paint: animals and art in the Upper Palaeolithic. *Man* 23, 671–95.

Mithen, S.J., 1991. Ecological interpretations of Palaeolithic art. *Proceedings of the Prehistoric Society* 57(1), 103–14.

Potts, R., 1992. The hominid way of life, in Jones *et al.* (eds.), 325–34.

Stringer, C.B., 1992. Evolution of early humans, in Jones *et al.* (eds.), 241–52.

van der Merwe, N.J., 1992. Reconstructing prehistoric diet, in Jones *et al.* (eds.), 369–71.

Chapter 7

Digging for Memes: the Role of Material Objects in Cultural Evolution

Mark Lake

The archaeological record exhibits a combination of stability and change that would be familiar to palaeontologists studying the evolution of biological species. As a result it has been suggested by universal Darwinists that culture change is governed by the same basic process as biological evolution, but with genes and organisms replaced by memes and cultural traits. This paper assesses that claim, paying particular attention to the relationship between material culture and memes. Specifically, it asks: what are memes, how are they replicated and what is the role of material objects in their replication? The paper argues that the currently fashionable definition of the meme obscures its most important property, that it should effect the direct transmission of symbolic structure. Once this is appreciated it can be seen that material objects might represent memes, express memes, or function in a way that conflates representation with expression. These possibilities are illustrated by reference to musical scores, village plans and changes in Late Neolithic beaker morphology. The paper concludes that the role of material objects in cultural evolution cannot be captured in one simple model, but depends on whether they carry or embody a symbolic code.

Many anthropologists accept that at a phenomenological level human culture exhibits the properties of an evolutionary system: for example, the archaeological record exhibits a combination of structural stability and evolutionary morphogenesis akin to that observed by palaeontologists studying the origins and demise of biological species. In other words, it is widely acknowledged that it *looks as if* culture change is governed by the same generic process as biological evolution. More controversially, evolutionary biologists and philosophers who subscribe to the notion of a universal Darwinism have made the stronger claim that culture-change actually *is* governed by the same process. They argue that culture evolves as a result of the differential replication of *memes*, cultural entities which play a role analogous to that of genes.

This paper investigates the role of material objects in cultural evolution. It considers three questions: what are memes, how are they replicated and what is the role of material objects in their replication? Since the subject is fraught with difficulty the answers are undoubtedly partial, if not plain wrong. They also make difficult reading on occasion, for which no apology is offered save in instances of muddled thinking or poor expression. The principal purpose of this project is to draw archaeologists and anthropologists into the debate about memes, for the simple reason that those who promote them most vigorously tend to be remarkably vague about the details. The idea that culture evolves by memetic replication emerged from the interface between evolutionary biology and philosophy, although neither discipline is particularly well placed to observe how culture actually changes. Consequently there is a clear role for anthropology — and archaeology in particular — in any serious evaluation of memetic replication. In return, the principles of universal

Darwinism provide a useful framework for thinking about the relationship between ideas and material objects, whether as a heuristic device or as an explanatory system.

The study has three parts. First the idea of universal Darwinism is introduced in order to clarify what it means to suggest that culture 'evolves' *sensu stricto*. Second, the analytic units of universal Darwinism are employed to explore the notion that culture evolves by memetic replication. It is argued that the tendency to model the meme as a direct analogue of the gene has confused attempts to identify the mechanism of cultural replication: the resulting emphasis on fidelity and fecundity has obscured the basic principle that cultural replication requires the direct transmission of symbolic structure. It is further argued that imitation does not effect the direct transmission of symbolic structure and that consequently — and contrary to widespread supposition — it is insufficient to support cultural evolution. These arguments inform the attempt in the third part of this paper to elucidate the role of material objects in cultural replication. It is suggested that material objects might function in one of three ways in cultural replication: as representations of memes, as expressions of memes, or in a manner that conflates representation with expression. Culture can only be said to evolve *sensu stricto* when the representation of memes is distinct from their expression. It is argued that objects that carry or form part of a symbolic code can represent memes without simultaneously expressing them. Other objects appear to conflate representation with expression.

Universal Darwinism

The term 'universal Darwinism' has been used to refer to two related ideas. It was first used by Dawkins (1976) as a label for the notion that the processes responsible for biological evolution on earth are the same wherever adaptation and/or speciation is occurring or has occurred in the universe; it is now more widely used to refer to the idea that other forms of transformations of earthly living systems are also effected by these same processes (Plotkin 1994, 59). It is the latter usage which interests us here because it raises the possibility that culture-change is driven by the same processes as those which drive biological evolution. This has indeed been suggested (e.g. Campbell 1974; Dawkins 1976), as it has also for the functioning of the immune system (Burnet 1959; Jerne 1967), the functioning of the brain (Edelman 1987), the production of speech (Dennett 1991), scientific enquiry (Campbell 1974; Hull 1982), and individual learning (Blute 1981).

Evolution conceived as a generic process

Universal Darwinism treats neo-Darwinian evolution by natural selection (biological evolution) as the paradigmatic example of a generic process which may be implemented through any one of a number of mechanisms (Lewontin 1970). Neo-Darwinian evolution by national selection occurs because genetic mutations that, via their phenotypic expression, allow an organism to reproduce more successfully than other organisms will increase in relative frequency in the gene pool, which in turn results in speciation. There is, however, some danger in adhering too closely to this model when abstracting the generic evolutionary process. As Hull (1988) has argued, the distinction between genes, organisms and species may seem natural, but it is not. It happens to work reasonably well for the evolution of fruit flies or humans, in fact for most multicellular sexual organisms, but it is far less helpful for the evolution of asexual and unicellular organisms. Given that the majority of organisms that have lived fall into the latter group, Hull rightly cautions against dismissing possible forms of non-biological evolution as incompatible with universal Darwinism purely on the basis of 'such peculiar phenomena as the transmission of eye colour in fruit flies' (Hull 1988, 21).

It is for this reason that universal Darwinists have attempted to provide a 'maximally abstract definition' (Dennett 1995) of evolution by natural selection which does not refer to genes, organisms, species, memes or cultures, since these are found only in specific implementations of the generic process. Instead, it requires specification of the algorithm by which all evolutionary change is effected and the classes of entities on which that algorithm acts. The algorithm has been formulated in many roughly equivalent versions (Brandon 1988; Campbell 1974; Lewontin 1970). For example, Plotkin's (1994) 'g-t-r heuristic' (i) blindly generates variants, (ii) tests or selects variants and (iii) regenerates the selected variants. Of more importance for the purposes of this paper, however, are the entities on which this algorithm acts, and here Hull's (1980; 1982; 1988) *replicator-interactor-lineage* (RIL) scheme is perhaps the most consistent.

Replicators, interactors and lineages

Logically, a *replicator* is 'an entity that passes on its structure directly in replication' (Hull 1980, 318). If one wishes for a teleological interpretation then it

has been suggested that replicators are what maintain adaptations for as long as needed (Plotkin 1994, 94), although it is also argued that they are themselves the things that evolution 'is for' (Dawkins 1976). The paradigmatic replicator is the gene; memes are also supposed to be replicators. According to Dawkins, replicators must have the three properties of longevity, fidelity and fecundity: they must be long lasting, capable of making accurate copies of themselves, and fertile in making as many copies as possible. This is a popular conception, but it is not clear that any of these three properties are actually necessary; instead, they are properties which a replicator should ideally possess in order to be readily observable. Dennett (1995, 356) is particularly clear on this point when he notes that although low fidelity replication may render it difficult to identify species, this is an epistemological, not a metaphysical issue. It may be difficult to identify species (and hence the existence of certain replicators) in the absence of a degree of stasis, but it does not follow that the process giving rise to speciation is not evolution by natural selection.

An *interactor* is 'an entity that directly interacts as a cohesive whole with its environment in such a way that replication is differential' (Hull 1980, 318). The paradigmatic interactor is the organism, but even in the case of biological evolution it is possible for other entities such as genes and colonies to function as interactors (Hull 1988, 28). The advantage of making a distinction between interaction and replication can be seen in the way it helps to clarify the debate between gene selectionists and organism selectionists. When gene selectionists claim that genes are the primary units of selection they mean that they are the primary units of replication, whereas when organism selectionists insist that organisms are the primary units of selection they mean that organisms are the primary units of interaction (Hull 1988, 28).

Replication and interaction result in the production of *lineages*: the entities that actually change, or evolve as a result of the evolutionary process (Hull 1980, 327). In the paradigmatic example of biological evolution there is currently no consensus about what actually evolves. Gradualists (e.g. Dawkins 1976) would argue that species are the things that evolve, in which case species can be construed as lineages. In contrast, punctuationists argue that species are incapable of evolving. If their view that significant change occurs only at speciation is correct, then it is the lineages formed by successions of species which are the things that evolve (Eldredge & Gould 1972; Gould 1982). However this debate is resolved, the most important aspect of lineages as conceived in Hull's RIL scheme is that they are historical entities, not classes or natural kinds (Hull 1982). Natural kinds are defined in terms of a set of characteristics which are necessary and sufficient for membership, and are eternal in the sense that they continue to exist whether or not they have any members. Since this implies that entities that possess the appropriate characteristics will always belong to the *same* class, irrespective of how they came into being, it is clear that classes are not the sort of things that can evolve. In contrast, the identity or continuity or a historical entity is found in the ancestor-descendant relationship of its constituent entities, not in their similarity. The fact that evolution produces historical entities refutes the common argument (Wispé & Thompson 1976) that social or cultural change is not evolutionary because biological species are classes, whereas social groups and cultures are not. The error lies either with the assumption that species are classes, or with the view that species, rather than lineages of species, are the product of biological evolution.

Universal Darwinist approaches to culture-change

Replicators and interactors function in the evolutionary process to produce lineages. If culture-change conforms to the principles of universal Darwinism then there must exist cultural manifestations of these entities. In 1977, Bronowski concluded that we lack genuine theories of sociocultural change because 'we have not been able to pin down the units with which it works — which it shuffles and regroups, and whose mutation make the raw material for new culture'. Nearly twenty years later Plotkin noted that 'if cultures are indeed evolving systems, then in the language of universal Darwinism, the replicators, interactors and lineages must be identified and their properties understood' (1994, 216). Thus it appears that the recent enthusiasm of philosophers and evolutionary biologists for universal Darwinism has sharpened our conceptual tools, but that these have yet to be rigorously applied in the context of culture-change; this paper is an attempt to do just that.

Two approaches to cultural evolution fall under the umbrella of universal Darwinism. They may be conceived as overlapping, but each with a different centre of gravity. The first errs towards a teleological enquiry: it asks what cultural evolution is for in the sense of what kind of knowledge does it allow an organism (a human) to gain. This enquiry forms part of the project of evolutionary epistemology (Campbell 1974), which views evolution as a

knowledge-gain process such that each specific evolutionary mechanism provides a particular kind of knowledge to a particular kind of entity (Odling-Smee 1983; Plotkin 1994; Plotkin & Odling-Smee 1979; 1981; 1982). I have suggested elsewhere (Lake 1995; 1996) that this approach provides the appropriate theoretical framework within which to address the question of why and when the capacity for culture evolved during the course of hominid evolution. The second universal Darwinist approach to culture is of more relevance for later prehistory, and thus also to the aims of this paper. It is concerned with understanding how cultural evolution works, not in order to explain what it is 'good for', but to explain how the end product — the content of culture — changes. This approach is primarily manifest in the writings of evolutionary biologists and philosophers such as Dawkins (1976; 1982; 1986) and recently Dennett (1990; 1991; 1995).

Cultural replication

In 1976, Dawkins argued that cultural evolution is effected by differential replication of memes, the cultural analogue of genes, and that this process obeys the principles of universal Darwinism quite exactly. More recently he retracted this strong claim, cautioning that the meme-as-gene analogy is useful but may not be exact (1982; 1986). Strictly speaking, however, the analogy need not be exact for cultural evolution to conform to the principles of universal Darwinism: what matters is that memes are differentially replicated to produce lineages. But what are memes?

Memes are a subset of cultural replicators

According to Dawkins, 'examples of memes are tunes, ideas, catch-phrases, clothes fashions, ways of making pots or of building arches' (1976, 206). The notion that memes are ideas is entirely compatible with the universal Darwinian position that replicators are substrate neutral, in other words, that they are informational not material entities. The same is held to be true of genes (Williams 1966), although this is often overlooked in popular accounts of biological evolution. Dennett is more explicit about what sort of ideas memes are. The examples he provides are all 'complex ideas that form themselves into distinct memorable units' (1995, 344) and he goes on to suggest that these units are 'the smallest elements that replicate themselves with reliability and fecundity' (Dennett 1995, 344).

While it is probably correct to conceive of memes as ideas, there is nevertheless something very wrong with Dennett's definition of the meme *if it is also intended as a definition of the cultural replicator*. The properties of fidelity and fecundity that Dennett ascribes to memes are those that define them as members of the subset of *successful* cultural replicators; they are not properties necessarily shared by all cultural replicators. In other words, it may well be that the complex ideas listed by Dennett are cultural replicators, but it is far from clear that all cultural replicators are similarly repeated complex ideas. As already noted, Dennett himself argues that although fidelity and fecundity render lines of descent visible, they are not defining properties of a replicator. The definition of the meme as a successful cultural replicator almost certainly stems from the tendency to conceive of it as directly analogous to the gene. Although the gene is often cited as the paradigmatic replicator, it too is actually defined as a successful replicator. According to Dawkins a gene is any replicator that lasts long enough through enough replications to serve as a unit of selection (1976, 30). Or as Williams suggests, 'In evolutionary theory, a gene could be defined as any hereditary information for which there is favourable or unfavourable *selection* bias *equal to several or many times its rate of endogenous change*' (1966, 25 [my italics]). It follows that a mutated gene which causes an organism not to reproduce is still a replicator, albeit an unsuccessful one: indeed, it is replicator but not a gene.

The current tendency to define the cultural replicator with reference to the properties of things that form extended cultural lineages is problematic because it confuses replication with interaction. Consider Dennett's claim that the idea for the four opening notes of Beethoven's Fifth Symphony (G-G-G-Eb) constitutes a replicator, whereas that for the notes D-F#-A does not. There is nothing intrinsic in the structure of the first sequence that renders it more replicable than the second: the work required to encode each in some medium in order that its structure can be replicated is not obviously dissimilar. Rather, if the notes G-G-G-Eb are hummed more frequently it is because that sequence has a more favourable effect (is more adaptive) when exposed to the selective conditions imposed by the musical tradition of western high culture.[1] On this analysis the ideas for both G-G-G-Eb and D-F#-A are replicators, but that for G-G-G-Eb is more strongly selected for and therefore more prevalent in culture. (Since the notes G-G-G-Eb provide a useful example with which to evaluate several candidate mechanisms of replication they are hereafter referred to as the 'destiny'

meme — after Beethoven's own suggestion that they represent 'destiny knocking at the door'.)

The identification of memes as ideas that form extended cultural lineages is logically flawed *if it is also intended as a definition of the cultural replicator* precisely because it overlooks the crucial Darwinian principle that replication is differential. This might not present a serious problem for archaeological purposes insofar as the entities which archaeologists have implicitly or explicitly considered treating as memes *do* appear to form extended lineages, for example Acheulean handaxes (Mithen 1994; Steele 1994). Nevertheless, any attempt to elucidate the role of material objects in cultural evolution does require an understanding of how replication comes to be differential. This requirement is unlikely to be realized so long as the cultural replicator is defined in a manner which confuses replication with interaction.

Imitation as a mechanism of cultural replication

Dawkins suggested that memes 'propagate themselves in the meme pool by leaping from brain to brain via a process, which in the broad sense, can be called imitation' (1976, 206). Recast in everyday language this seems reasonable enough: cultural replication occurs when ideas are transferred from brain to brain by some form of copying. Nevertheless, any attempt to be more rigorous soon reveals that the notion of imitation 'in the broad sense' is hopelessly vague.

Consider again the idea for the sequence of four notes that open Beethoven's Fifth Symphony, the 'destiny' meme. This meme could presumably be replicated in at least three ways: transmission from one brain to another could be effected by humming or playing the notes, by writing them down, or by describing them verbally. Only the first of these bears any resemblance to the phenomenon that psychologists and cognitive ethologists would recognize as imitation, that is, the copying of 'novel actions which are not already present in the behavioural repertoire of the learner' (Byrne 1995). Nevertheless, whether this counts as cultural replication depends on what one thinks is happening mentally. The important distinction is between *impersonation*, in which a novel action is acquired simply by taking the model's geometrical perspective and copying the motor-sequence, and *program-level imitation*, in which the model's intention is understood and the action reproduced to that end (Byrne 1995). Impersonation is not a mechanism of cultural replication since it does not involve the transmission of an idea. In contrast, since program-level imitation does not involve the transmission of an idea it has the potential to effect cultural replication. It has recently been argued, however, that program-level imitation does not ensure adequate fidelity of transmission to effect cultural replication (Heyes & Plotkin 1989; Heyes 1993).

It has already been noted that in Dawkins' view replication requires high-fidelity transmission, from which it follows that memes must be subject to a minimum of modification as they leap from brain to brain. This is the view that has found its way into cultural transmission theory, where it is manifest in the assumption that individual learning and cultural replication are strictly *alternative* ways of acquiring a behavioural trait (Boyd & Richerson 1985, 97). (The following argument assumes that the acquisition of a behavioural trait implies the transmission of an underlying idea for the behaviour, that is, program-level imitation.) Individual learning cannot effect replication because, by definition, it implies the generation of a novel behaviour through direct interaction with the world. Instead, it is supposed that replication is effected by an entirely separate type of 'cultural' learning in which one individual acquires the behaviour of another. The important feature of cultural learning is that it is *direct*, that is to say, the individual who acquires the behaviour does not modify it in the process of copying. It is frequently assumed that imitation is a mechanism of cultural learning (Washburn 1908; Piaget 1962; Dawkins 1976; 1982; Boyd & Richerson 1985; Rogers 1988; Galef 1992), but according to Heyes & Plotkin (1989) this assumption is problematic because it is far from clear that imitation is psychologically distinct from individual learning.

Heyes & Plotkin (1989) accept that imitation is direct in the sense that because the naïve individual does not interact with its environment there is less opportunity for environmental variables to intervene and alter the behaviour that is acquired. Nevertheless, they suspect that imitation is not direct at the retention stage. It seems that, as a psychological process, imitation is not vastly different from some individual learning processes (Bandura 1977). This leads Heyes & Plotkin to doubt whether ideas for behaviour that are acquired by imitation are any better insulated against the kinds of loss and transformation that occur during storage of ideas acquired by other means. There is indeed evidence that culturally acquired ideas are often lost or transformed in memory (Bartlett 1932; Bandura & Walters 1963; Loftus 1979). Consequently, Heyes argues that imitation can only effect cultural learning if it is buttressed by additional psychological processes which

insulate or reinforce the acquired ideas (1993).

This argument is flawed for two reasons. First, the requirement for high-fidelity transmission arises from the prevailing, but unhelpful, assumption that cultural replication can be equated with the production of extended cultural lineages. Heyes' reservation about the ability of imitation to effect *the production of extended cultural lineages* may be correct: it is at least plausible that spatially and temporally persistent ideas need to be maintained by processes that insulate socially transmitted information from modification through individual learning. Nevertheless, it does not follow (*contra* Lake 1995) that imitation is not a mechanism of cultural replication. It was argued above that replication should not be defined as a process that produces extended lineages because to do so is to overlook the crucial Darwinian principle that replication is differential. Accordingly, imitation need only be capable of transmitting an idea from one brain to another for it to remain a candidate mechanism of cultural replication. Heyes & Plotkin fail to demonstrate that this is not the case because — and this is the second problem with their argument — their conception of the scope of replication is too inclusive. Their reservations about the status of imitation as a form of cultural learning stem from the suspicion that it fails to insulate acquired information from transformation in memory. In other words, they suspect that memes acquired from person A are often transformed in the brain of person B before they are passed on to person C. This is not an argument against imitation as a form of cultural replication because the transmission of a meme from person A to person C is not one instance of replication, but at least two and possibly more. Transmission of a meme from A to B is one instance of cultural replication, as is transmission from B to C. What happens while a meme is 'stored' in the brain of person B is another question altogether, and not one which can be pursued here.[2] What matters for the moment is that there is nothing in Heyes & Plotkin's account of imitation to suggest that transmission from A to B or B to C cannot be effected by imitation.

The real problem with imitation

If imitation cannot effect cultural replication the reason has nothing to do with fidelity of transmission, but results from a problem which is altogether more profound: that it does not effect the direct transmission of symbolic structure. Earlier it was suggested that the 'destiny' meme might be replicated by humming or playing the notes G-G-G-Eb, by writing them down, or by describing them verbally. The first of these possibilities differs from the other two in that it might count as imitation in the strict sense. It also differs in another interesting respect: it is the only mechanism in which the notes are actually sounded. The reason why this is significant has a direct bearing on the role of material objects in cultural replication.

Recall that logically a replicator is an entity which passes on its structure directly in replication (however imperfectly). Recall also that replicators are information, that is to say, they are symbolic structures which code for, or refer to, non-symbolic structures. If a replicator passes on its structure *directly* then replication must be a process in which symbolic structure is transmitted without decoding. For sure, the symbolic structure often is decoded, but it is part of the process of interaction, not replication. In the case of biological evolution, for instance, genes provide information about how to build an organism. The fitness of the organism determines the frequency with which the genes that coded for it are replicated, but these genes are never re-encoded, or 'distilled' from the organism. Consequently physical or behavioural traits acquired by an organism during its lifetime cannot be passed on genetically to its offspring. The inheritance of acquired characteristics, termed Lamarckian inheritance, has no place in neo-Darwinian evolution by natural selection. Any universal Darwinian account of culture-change must similarly reject Lamarckian inheritance in favour of the direct replication of symbolic structure.[3]

Does humming or playing the sequence of four notes that open Beethoven's Fifth Symphony constitute the direct transmission of the 'destiny' meme? This seems unlikely precisely because the notes are sounded; instead, the symbolic structure (the meme) is decoded to produce a non-symbolic structure (the sound) and this is then re-encoded into a symbolic structure. The logic of this argument is clear if one considers what happens when one note is incorrectly played. If person A has the idea G-G-G-Eb but plays it as, say, G-G-G-E, then person B retrieves the idea G-G-G-E: there is no way that person B can retrieve the correct sequence *solely from this episode of transmission*. More importantly, an error in heterocatalysis (the generation of non-symbolic structure from symbolic structure) has become incorporated in the new symbolic structure. Since this is clearly an instance of Lamarckian inheritance it follows that one person playing the notes to another does not constitute a mechanism of cultural replication.

It is likely that this argument can be general-

ized to all cases of program-level imitation. As already noted, the defining feature of program-level imitation is the transmission of the idea behind an action. This is not replication, because the idea is always transmitted *through the action to which it refers*. Common usage of the term imitation illustrates the point clearly: my actions in imitating you fishing for termites will be very different from my actions imitating you writing instructions on how to fish for termites! The problem with program-level imitation is not that it fails to ensure fidelity of transmission, but that it is not a mechanism for the direct transmission of symbolic structure, whether accurately or otherwise. In other words, program-level imitation conflates the process of replication with the process of interaction. Note, however, that it does not follow that a single entity cannot function as both a replicator and an interactor; such a dual role is logically possible and may actually occur in biological evolution (Hull 1988, 31). Instead, the objection to imitation as a mechanism of replication is that it does not directly copy the replicator so much as *retrieve* it from the interactor. The notion of retrieval is central to the following discussion of the role of material objects in cultural replication.

The role of material objects in cultural replication

Can the 'destiny' meme be said to have been replicated if the four notes G-G-G-Eb are written down, or the score reprinted? At first sight it appears that either transmission process could be ruled out as a mechanism of replication for the same reason that imitation was rejected: that if, for instance, person A has the idea G-G-G-Eb but writes it as G-G-G-E, then person B can only receive the idea G-G-G-E from this episode of transmission. The vital difference, however, is that this is an error in autocatalysis (the regeneration of symbolic structure) rather than heterocatalysis (the generation of non-symbolic structure from symbolic structure). In terms of the biological analogy, the new replicator G-G-G-E has been produced by genetic mutation rather than the inheritance of an acquired characteristic. Even if subject to error, transmission through a score counts as replication because person B receives the symbolic structure directly: he or she does not retrieve it from the non-symbolic structure for which it coded.

Representation versus expression

Clearly the argument that transmission through a score counts as replication hinges on the notion that the score is a physical manifestation of the symbolic structure rather than a realization of the non-symbolic structure. Turning again to the biological analogy, it supposes that the score is to the idea as DNA is to a gene. This is a reasonable supposition because the score is not the end point in the chain of signification. As Hull notes, 'a country cannot serve as its own map. Sooner or later, representations must culminate in something which is not a representation' (1982, 302 [after Lewis Carroll]). In this case the *idea* for the sound is the thing represented and the score one of many possible representations. A fundamental asymmetry points to the logic in this: whereas written musical notation would not exist in the absence of musical ideas, musical ideas can be developed in the absence of written musical notation. One might of course wonder why the sound itself could not function as the end point in the chain of signification, in other words, that the score represents the idea which in turn represents the sound. This position is incompatible with a universal Darwinian account of culture-change for the same reason that a gene is not a representation of a phenotype. By definition, a representation comes after the fact, not before it. Consequently, since the genotype is necessarily prior to the phenotype it cannot be said to represent it. Instead it is better to conceive of the phenotype as an expression of the genotype. Similarly, the idea is prior to the sound; the sound is an expression of the idea. And just as the form of the phenotype is referable in its particulars to ontogeny rather than phylogeny, so the exact sound is dependent upon the performance.

The above consideration of the candidate mechanisms by which the 'destiny' meme might be replicated suggests that material objects might play three different roles in culture-change. First, they might function as representations of memes, that is, as the material manifestations of memes. In this case a material object is not strictly a meme, but an arrangement of matter which retains the initiating structure of the meme. Such objects effectively function as the 'DNA' of culture. Second, material objects might function as interactors. Such objects are the expressions of memes; they are not representations of memes but the things that memes code for. They function as the 'organisms' of culture, and cultural replication comes to be differential on account of their differing utility.[4] Third, material objects might function in a way that conflates the process of replication with the process of interaction. In this case, an object is both the expression of a meme and at the same time its representation.

It was argued above that transmission of a

meme through its expression cannot count as cultural replication *sensu stricto* because this is a Lamarckian mode of inheritance. The same argument applies to material objects that constitute both the expression and representation of a meme: the production of such objects does not result in the direct transmission of symbolic structure because it conflates replication with interaction. It follows that if objects generally play the third role identified above, then cultural evolution does not conform to the principles of universal Darwinism. Only the first and second roles are compatible with a strictly Darwinian model of culture-change as an evolutionary process. Consequently, whether the creation and/or use of material objects supports cultural evolution *sensu stricto* depends upon whether they represent, express or conflate the representation and expression of memes.

Symbolic objects represent memes

The argument presented above, that written musical notes can effect the cultural replication of a meme, is an argument that a particular type of material object, a score, can function as the representation of one or more memes. It seems likely that other objects, such as cuneiform number signs, stone inscriptions and books can likewise effect cultural replication. The property that all these objects share, which allows them to represent memes, is that they are symbolic: their form is arbitrary with respect to the expression of the memes for which they code. This ensures the direct transmission of symbolic structure.

The objection that objects such as these are not representations of memes because different people interpret them differently is not well founded. The objection, for example, that the opening four notes of Beethoven's Fifth Symphony do not always sound the same is based on a failure to appreciate the nature of heterocatalysis. Consider the biological analogy. The relationship between genotype and phenotype is one-to-many, not one-to-one: the broad form of the phenotype is determined by the genotype, but much final detail will be determined in response to the developmental environment. The genotype sets the parameters within which environmental responses can vary, but this is as much as it does lawfully. Exactly the same is true of memetic expression. Certain rules direct the general form of the expression, but the particulars are referable to individual circumstances. The rules of the English language ensure that the reader does not mistake Cassius for Brutus in Shakespeare's play *Julius Ceasar*, but they do not determine the exact intellectual understanding or emotional response.

The objection that symbolic objects are not representations of memes because some people may not be able to interpret them at all is more pertinent. When someone who is unable to read French is presented with an original text of Jacques Le Goff's *The Medieval Imagination* then effectively there are no rules for heterocatalysis. Nevertheless, this apparent disanalogy between genetic and memetic expression does not necessarily present a serious obstacle to a universal Darwinian account of culture-change. First, it has no bearing on the efficacy of cultural replication since autocatalysis and heterocatalysis are entirely separate processes. It is possible to copy a French text word for word and thereby replicate the ideas it conveys irrespective of whether one can read French. If the disanalogy poses any obstacle it is with respect to selection. Universal Darwinism requires that variation in interactors should be correlated with the variation in replicators: replicators could not be selected according to the fitness of their expressions if this were not so. The fact that the physical and chemical laws that direct biological heterocatalysis apply throughout the universe guarantees this for biological evolution. In contrast, the rules that direct cultural heterocatalysis are not uniform throughout the known cultural universe. Nevertheless, non-random selection is still possible, indeed probably widespread. The only difference between cultural and biological selection is that the rules that direct heterocatalysis contribute to the selective conditions of the former, but not the latter. While this might possibly result in novel population-level consequences for culture, it does not obviously undermine the logic of universal Darwinism.

Village plans both represent and express memes

Village plans are seldom, if ever, truly random. For example the villages of the Eden Valley (NW England) fall into three types: those with regular rows of tofts[5] arranged along a street green, those with irregular or part regular rows based on axial streets combined with a central green, and those without a green (Roberts 1989). Clearly these villages have been laid out according to some sort of template, but although they are described as 'planned' (Roberts 1989) this is not a claim that they were laid out from actual drawn plans. Instead the villages are their own template. If there is a meme for regular rows of tofts along a street green then the village of Milburn, for example, is both a material representation of the symbolic structure of that meme and simultaneously an instance of its non-symbolic expression. Since this meme is both expressed by and transmitted through

the same material form, the village plan is replicated by a process that is Lamarckian and not Darwinian — the plan is retrieved from the village.

Hillier & Hanson (1984) have likewise argued that the common spatial properties shared by settlements in the Vaucluse of southern France are generated by a mechanism which is not Darwinian. These settlements were not planned as wholes, but grew accretionally. Nevertheless, they all share the same 'beady ring structure'. Hillier & Hanson demonstrate that this can be generated by locating each building according to a set of simple rules. Consequently, each settlement can be treated as a discrete system, that is a system which depends on the embodiment of local rules in a dynamic spatio-temporal process. The most important point about this for our purposes is that according to Hillier & Hanson the genotype-phenotype distinction is inverted in discrete systems. In their view, 'What genetic instructions are to a biological system, spatio-temporal reality and activity are to a discrete system' (1984, 44). They suggest that the order in a discrete system arises not as an expression of a genotype, but because the components of the system have a mechanism which permits them to retrieve a description of the system from the system itself. This mechanism sounds suspiciously analogous to that of imitation, and it too is clearly Lamarckian.

The trouble with beakers

It is reasonably clear how the musical score and village plan are implicated in cultural replication. In the case of the beaker it is less clear. The lacustrine zones northwest of the Alps probably provide the most fine-grained prehistoric archaeological data available anywhere in Europe (Pétrequin 1993). Here the ruins of permanent villages established on lakes between 3700 and 2400 BC (the Middle Neolithic II and Late Neolithic) have been preserved in waterlogged conditions. As a result, many perishable materials have been recovered and, perhaps most importantly, some timbers have been dated by dendrochronology to the nearest year of felling. This precise dating has enabled Pétrequin to document changes in beaker morphology with a resolution of a few generations at most.

One of the most intriguing changes reported by Pétrequin concerns the decision by the communities of Chalain and Clairvaux to copy the flat-bottomed beaker favoured by their Swiss neighbours. Since these communities were used to making round-bottomed pots they had to learn a new technique that involved letting the pot dry as it was built up by coiling. What is particularly interesting for our purposes is that this technique appears to have been learned by trial and error rather than acquired with the form itself:

> The little tricks that they used to get from the round to the flat bottoms are proof that the adaptation was not easy and that the process took two or three generations at least. To make a flat bottom, the Chalain potters first built up a round bottom with a horizontal stabilizing cordon, sometimes the round bottom was even hidden by adding clay along the inside of the annular cordon; from the outside, it looked exactly like flat-bottomed vessel, built up directly from a lump of clay. In this case, the technique of the true flat bottom became known and adopted only after a long period of trial and error; the idea had been transmitted without a proven technique to go with it. (Pétrequin 1993, 48)

Pétrequin's observations that the idea of the flat bottom had been transmitted in isolation from the appropriate manufacturing technique strongly suggests this idea can be treated as a meme. It is the idea for the finished form which has been replicated and not a process of manufacture which 'just happens' to give rise to that form. What is the role of the beaker as a material entity in this instance of cultural replication? If, as Pétrequin tentatively suggests (1993, 69), the idea of the flat bottom was transmitted in the shape of the vessel itself, then this is another case where replication is conflated with interaction. The meme was retrieved from its expression, the form of the beaker, but this latter also provided the medium of transmission. Strictly speaking this is a case of Lamarckian inheritance. Consequently, it is striking that the Chalain and Clairvaux potters managed to retain the original idea of the final form over two or three generations of striving to find the appropriate technique. If potters learned of the new form from each other, then the idea of the true flat bottom should eventually have been lost in the process of retrieval from the various approximations. That it was not can be explained in at least three ways. First, it could be that potters only ever learned of the flat bottom from imported Swiss beakers, even though they must presumably have learned the technique from indigenous examples or practices (given the suggested cross-generational striving). A second possibility is that the idea of a flat bottom was a very generalized concept. Perhaps a round bottom with stablizing cordons met the conceptual requirements of a flat bottom, in which case one might suggest that the Chalain and Clairvaux beakers eventually acquired true flat bottoms simply because that form is

ultimately more stable. This, however, suggests that a mode of use was transmitted along with the idea of a flat bottom. The third possibility is that idea of the flat-bottomed beaker was not transmitted through the beaker itself, but by some other, perhaps pictorial or linguistic, means.

If the idea of the flat-bottomed beaker was transmitted by pictorial or linguistic means this would count as an instance of true cultural replication conforming to the principles of universal Darwinism. The two other explanations for how potters managed to retain the original idea over two or three generations spent learning the appropriate technique both assume that the transmission process was Lamarckian. They do, however, suggest ways in which organizational, ritual or functional forces can constrain or channel Lamarckian inheritance in such a way that it mimics the population-level consequences of Darwinian inheritance. This is similar to Heyes' argument that imitation can produce extended cultural lineages if buttressed by additional reinforcing mechanisms, but it is different in that the need for reinforcement stems from the indirect transmission of symbolic structure rather than from a lack of fidelity in true replication.

Conclusion

This paper set out to investigate the role of material objects in cultural evolution. To that end it addressed three questions: what are memes, how are they replicated, and what is the role of material objects in their replication? Memes, like genes, are currently defined as successful replicators. By confusing high-fidelity replication with successful interaction this definition obscures the essential property of cultural replication: that it effects the direct transmission of symbolic structure. Imitation is not a mechanism of cultural replication precisely because it cannot effect the direct transmission of symbolic structure: the idea for an action is not directly transmitted, but retrieved from the action itself. This distinction between direct transmission and retrieval provides the basis for suggesting that material objects might represent memes, express memes, or function in a way that conflates representation with expression. It appears that objects such as musical scores and texts have the potential to represent memes, whereas complex material forms such as village plans conflate representation and expression. Since the conflation of representation and expression results in Lamarckian inheritance it follows that not all culture-change is evolutionary in the strict Darwinian sense. Nevertheless, as suggested by changes in beaker morphology, it is at least possible that organizational, ritual or functional forces can channel Lamarckian inheritance so as to mimic the population-level consequences of Darwinian inheritance. Overall it appears that the role of material objects in cultural evolution cannot be captured in one simple model, but depends crucially on whether they carry or embody a symbolic code.

Acknowledgements

I am grateful to the organizers of the conference for the opportunity to commit my thoughts to paper and for an agreeable and stimulating three days in Cambridge. Nyree Finlay, Edward Lowe, Gilbert Marshall, Steven Mithen and Stephen Shennan have all helped clarify my thinking. I, alas, am the source of any confusion.

Mark Lake
Institute of Archaeology
University College London
31–34 Gordon Square
London
WC1H 0PY

Notes

1. It is unclear why Dennett chose the standard major triad D-F#-A to contrast against G-G-G-Eb. D-F#-A (the tonic chord of D major) is a key in which much Western folk music is played (Sophie Lake pers. comm.) and it is therefore frequently replicated as a chord. Perhaps Dennett means to draw attention to the fact that G-G-G-Eb is frequently replicated outside its original musical context? If so he needs to be clearer as to whether the meme is the idea for the sound, or the idea — referable to Beethoven himself — that the sound represents 'destiny knocking at the door' (Tovey 1935). An additional complication in that respect is that many of Beethoven's themes can be recognized by the bare rhythm without quoting any melody at all (Tovey 1935).
2. One possibility is that whenever an idea is recalled an underlying potential brain state is reconstituted (Plotkin 1994). According to this interpretation each reconstitution counts as one instance of cultural replication. Suffice it to say, however, that 'However such actual [reconstituted] brain states are re-established from potential brain states is . . . a process whose details are entirely unknown by brain scientists. We simply do not know how it works' (Plotkin 1994, 219).
3. There has been much confusion about whether cultural evolution is Lamarckian (Hull 1982). It looks Lamarckian from the perspective of biological

evolution because behaviours that are not genetically coded can be passed from generation to generation. Here, however, I am only concerned with whether cultural evolution is Lamarckian *in its own terms*.

4. I do not mean to imply utility solely in a mechanical-functional sense.
5. The private house plot.

References

Bandura, A., 1977. *Social Learning Theory*. Englewood Cliffs (NJ): Prentice Hall Inc.

Bandura, A. & R. Walters, 1963. *Social Learning and Personality Development*. New York (NY): Holt, Rinehart & Winston.

Bartlett, F.C., 1932. *Remembering*. Cambridge: Cambridge University Press.

Blute, M., 1981. Learning, social learning, and sociocultural evolution: a comment on John Langton's 'Darwinism and the behavioural theory of sociocultural evolution'. *American Journal of Sociology* 86, 1401–6.

Boyd, R. & P.J. Richerson, 1985. *Culture and the Evolutionary Process*. Chicago (IL): Chicago University Press.

Brandon, R.N., 1988. The levels of selection: a hierarchy of interactors, in Plotkin (ed.), 51–71.

Bronowski, J., 1977. *A Sense of the Future*. Cambridge (MA): MIT Press.

Burnet, F.M., 1959. *The Clonal Selection Theory of Acquired Immunity*. London: Cambridge University Press.

Byrne, R., 1995. *The Thinking Ape: Evolutionary Origins of Intelligence*. Oxford: Oxford University Press.

Campbell, D.T., 1974. Evolutionary epistemology, in *The Philosophy of Karl Popper*, book 1, ed. P.A. Schlipp. Lan Salle (IL): The Open Court Publishing Company.

Dawkins, R., 1976. *The Selfish Gene*. Oxford: Oxford University Press.

Dawkins, R., 1982. *The Extended Phenotype*. Oxford: Freeman.

Dawkins, R., 1986. *The Blind Watchmaker*. London: Penguin.

Dennett, D.C., 1990. Memes and the exploitation of imagination. *Journal of Aesthetics and Art Criticism* 48, 127–35.

Dennett, D.C., 1991. *Consciousness Explained*. London: Allen Lane; Penguin Press.

Dennett, D.C., 1995. *Darwin's Dangerous Idea: Evolution and the Meanings of Life*. London: Allen Lane.

Edelman, G.M., 1987. *Neural Darwinism: the Theory of Neuronal Group Selection*. New York (NY): Basic Books.

Eldredge, N. & S.J. Gould, 1972. Punctuated equilibria: an alternative to phyletic gradualism, in *Models in Palaeobiology*, ed. T.J.M. Schopf. San Francisco (CA): Freeman, Cooper & Co., 82–115.

Galef, B.G., 1992. The question of animal culture. *Human Nature* 3, 157–78.

Gould, S.J., 1982. Darwinism and the expansion of evolutionary theory. *Science* 216, 380–87.

Heyes, C.M., 1993. Imitation, culture and cognition. *Animal Behaviour* 46, 999–1010.

Heyes, C.M. & H.C. Plotkin, 1989. Replicators and interactors in cultural evolution, in *What the Philosophy of Biology Is*, ed. M. Ruse. Dordrecht: Kluwer Academic Publishers, 139–62.

Hillier, B. & J. Hanson, 1984. *The Social Logic of Space*. Cambridge: Cambridge University Press.

Hull, D.L., 1980. Individuality and selection. *Annual Review of Ecology and Systematics* 11, 311–32.

Hull, D.L., 1982. The naked meme, in Plotkin (ed.), 272–327.

Hull, D.L., 1988. Interactors versus vehicles, in Plotkin (ed.), 19–50.

Jerne, N.K., 1967. Antibodies and learning: selection versus instruction, in *The Neurosciences: a Study Program*, eds. G.C. Quarton, T. Melnechuk & F.O. Schmitt. New York (NY): Rockerfeller University Press, 200–205.

Lake, M.W., 1995. Computer Simulation Modelling of Early Hominid Subsistence Activities. Unpublished Ph.D. dissertation, University of Cambridge, Cambridge.

Lake, M.W., 1996. Archaeological inference and the explanation of hominid evolution, in *The Archaeology of Human Ancestry: Power, Sex and Tradition*, eds. J. Steele & S. Shennan. London: Routledge, 184–206.

Lewontin, R.C., 1970. The units of selection. *Annual Review of Ecology and Systematics* 1, 1–18.

Loftus, E.F., 1979. *Eyewitness Testimony*. Cambridge (MA): Harvard University Press.

Mithen, S.J., 1994. Technology and society during the Middle Pleistocene. *Cambridge Archaeological Journal* 4(1), 3–33.

Odling-Smee, F.J., 1983. Multiple levels in evolution: an approach to the nature–nurture issue via applied epistemology, in *Animal Models of Human Behaviour*, ed. G.C.L. Davey. London: John Wiley & Sons, 135–58.

Pétrequin, P., 1993. North wind, south wind: Neolithic technical choices in the Jura Mountains, 3700–2400 BC, in *Technological Choices: Transformations in Material Cultures Since the Neolithic*, ed. P. Lemonnier. London: Routledge, 36–76.

Piaget, J., 1962. *Play, Dreams and Imitation in Childhood*. New York (NY): Norton.

Plotkin, H.C. (ed.), 1982. *Learning, Development and Culture: Essays in Evolution Epistemology*. Chichester: Wiley.

Plotkin, H.C. (ed.), 1988. *The Role of Behaviour in Evolution*. Cambridge (MA): MIT Press.

Plotkin, H.C., 1994. *The Nature of Knowledge: Concerning Adaptations, Instinct and the Evolution of Intelligence*. London: Allen Lane.

Plotkin, H.C. & F.J. Odling-Smee, 1979. Learning, change and evolution: an enquiry into the teleonomy of learning. *Advances in the Study of Behaviour* 10, 1–41.

Plotkin, H.C. & F.J. Odling-Smee, 1981. A multiple-level model of evolution and implications for sociobiology. *Behavioural and Brain Sciences* 4, 225–68.

Plotkin, H.C. & F.J. Odling-Smee, 1982. Learning in the context of a hierarchy of knowledge gaining processes, in Plotkin (ed.), 443–71.

Roberts, B.K., 1989. Nucleation and dispersion: distribution maps as a research tool, in *The Rural Settlements of Medieval England*, eds. M. Aston, D. Austin & C. Dyer. Oxford: Basil Blackwell, 59–75.

Rogers, A.R., 1988. Does biology constrain culture? *American Anthropologist* 90, 818–31.

Steele, J., 1994. Communication networks and dispersal patterns in human evolution: a simple simulation model. *World Archaeology* 26, 126–43.

Tovey, D.F., 1935. *Essays in Musical Analysis*. London: Oxford University Press.

Washburn, M.F., 1908. *The Animal Mind*. New York (NY): Macmillan.

Williams, G.C., 1966. *Adaptation and Natural Selection*. Princeton (NJ): Princeton University Press.

Wispé, L.G. & J.N. Thompson, 1976. The war between the words: biological versus social evolution and some related issues. *The American Psychologist* 31, 341–84.

Chapter 8

Personal Experience and Belief: the Significance of External Symbolic Storage for the Emergence of Modern Human Cognition

E.J. Lowe

The significance of external symbolic storage for the development of human cognition is not so much that it frees up working memory and facilitates the accumulation of collectively held information, important though these consequences are: rather, it is that it demands conceptually structured thought. Only a concept-user can regard an object as a symbolic representation of another object. Human perceptual experience is conceptually informed: we perceive our world as being populated by objects falling under concepts, and can recombine these concepts in reasoned thought. Lower animals are recognitionally sensitive to perceptual similarities and repeated situations, but do not conceptualize what they perceive and so cannot reflect upon past, future and merely possible situations. The emergence of human art, language and symbolism betokened the emergence of truly conceptual thinking (but did not enable it). The human capacity for conceptual thinking cannot be adequately described or explained by information-processing accounts of neural functioning or computational models of the mind/brain, because such approaches are insensitive to issues concerning concept possession and conceptual structure. Our capacity for conceptual thought is a good deal more mysterious than might be supposed, and the gulf between it and animal awareness is enormous.

In his fascinating and highly original book, *Origins of the Modern Mind*, Merlin Donald argues that human culture and cognition have passed through three distinct evolutionary stages to produce the modern human mind. According to Donald, the first transition, from the culture of apes and australopithecines to that of *Homo erectus*, involved 'the emergence of the most basic level of human representation, the ability to mime, or re-enact, events' (Donald 1991, 16). The second transition, from the culture of *Homo erectus* to that of *Homo sapiens*, in which the biological evolution of modern humans was completed, involved, he thinks, 'the emergence of the human speech system, including a completely new cognitive capacity for constructing and decoding narrative' (Donald 1991, 16). The third and final transition, he believes, was much more recent and non-biological in nature, involving 'the emergence of visual symbolism and external memory as major factors in cognitive architecture' (Donald 1991, 17). Inevitably, these claims are somewhat speculative, in view of the absence of any physical remains which could point conclusively to the separate occurrence of the first two transitions, each involving changes in forms of behaviour alone — the emergence of 'mimetic' activity and the emergence of speech activity, respectively.[1] In the nature of the case, only the third transition has, and can have, left physical remains as clear evidence of its occurrence, in the form of human artefacts with an obvious symbolic or representative function.

Accepting that this third transition occurred

— and leaving aside the altogether more contentious claim that it was indeed the last of three equally momentous but distinct transitions, as characterized by Donald — we may ask: what is the significance for modern human cognition of the emergence of systems of 'external symbolic storage' (ESS), in the form of visual symbolism, pictorial and written? One view (which I think is broadly Donald's own) is that the chief cognitive significance of this evolutionary development, which seems to have begun some thirty to forty thousand years ago at most, is that it freed human memory (both working memory and long-term memory) from the severe limitations imposed by the biology of the brain, as an information-processing system. Information could now be stored outside the individual brain, processed there (for instance, by using written mathematical symbolism for numerical calculation), and transmitted and accumulated in robust and reliable forms. Collective human knowledge, embodied in the world's libraries and more recently in computer data bases, now far transcends the memory capacity of any single human brain. Without written symbolism, it may be urged, most of modern scientific knowledge would simply be impossible: such symbolism, it may be said, is essential for the very construction of scientific knowledge, as well as for its storage and transmission.

I am not entirely convinced by such claims, even though they do clearly contain a large measure of truth. I believe that the emergence of ESS *was* a highly significant development for human cognition — but more on account of what it was *symptomatic* of than purely on account of any efficiency and capacity gains it incurred for human information-processing and data-accumulation (*cf.* Olson 1994). It is possible to exaggerate the degree to which ESS is essential for the emergence of anything like modern scientific knowledge. Even as recently as the Renaissance, it probably *was* possible for a single human individual to assimilate a sizeable fraction of the collective knowledge embodied in the books then in existence — not in the sense of being able to recite all these books by heart, but in the sense of understanding and retaining much of their significant content. The sheer *preservation* of such written knowledge could, moreover, in principle be achieved by a sufficiently well-organized oral tradition, such as that which, it seems, may initially have preserved such works as Homer's *Iliad* and *Odyssey*. A nice illustration of this possibility is provided by Ray Bradbury's futuristic novel *Fahrenheit 451*, which envisages a state in which books have been banned, but in which dedicated members of a dissident group take it upon themselves to memorize the last copies of whatever books they can lay their hands on before these are committed to the flames. Undoubtedly, ESS makes life much easier and the transmission and accumulation of collective knowledge much more secure — but it is not clear that it is absolutely indispensable in order for such transmission and accumulation to occur in anything like the way it has within historical time.

An alternative view of the cognitive significance of ESS, and one which I shall expand upon and defend in what follows, sees it as lying in the fact that the ability to use one physical object explicitly as a symbol for, or representation of, another physical object is indicative of — because it demands — a capacity for *conceptually structured thought*. Here it may be objected that an ability to use spoken language is itself precisely such an ability to use symbols or representations, so that this account of the cognitive significance of ESS fails to distinguish the significance of ESS from the significance of human systems of symbolism or representation in general. To this objection there are various possible replies. On the one hand it may be urged by psycholinguists, such as Jerry Fodor and Noam Chomsky, that human linguistic capacity is innate, 'hard-wired' and modular, involving only a *tacit* knowledge of phonetic, syntactic and semantic principles (Fodor 1983) — and accordingly that it does not demand, at root, an *explicit* recognition of certain physical objects (spoken words and sentences) as having a symbolic role. On this view, the human capacity for spoken language no more indicates a capacity explicitly to recognize one physical object as symbolizing or representing another than does the so-called 'language' of the bees. On the other hand, if it is held, as Donald Davidson holds, that a capacity for conceptual thought itself demands a capacity for language, and moreover that a language-user must be able to recognize both others and himself as *being* a language-user (Davidson 1984), then it will follow that it is *correct*, after all, to see a capacity for ESS and a capacity for language as being all of a piece as regards the cognitive demands which they impose upon those possessing them. Moreover, on this view of language, it would be proper to see spoken language itself as being, effectively, a resource for ESS no different in principle from the resources provided by visual symbolism. Sounds are, indeed, short-lived in comparison with pictures and inscriptions, but they do provide a means both for reducing the bur-

den on working memory and for storing collective knowledge. On the first point, it is a familiar fact that 'thinking out loud' (that is, in spoken words) facilitates processes of comprehension and reasoning; and on the second point, as already alluded to above, mnemonic techniques such as those embodied in rhyme and metre enable complicated bodies of information to be preserved accurately through oral tradition. It is true, of course, that memorizing a poem or recipe does utilize biological memory — but it greatly eases the burden on biological memory by reducing the requirement on *semantic* memory. In short, rote learning enables one to preserve detailed information much more accurately than does learning which requires a grasp of semantic content (think of how we learnt our multiplication tables at school).

The next thing that I need to explain is why it is that the ability to use one physical object explicitly as a symbol for, or representation of, another physical object demands a capacity for conceptually structured thought. The reason is that only a creature which perceives objects as *falling under concepts* can be in a position to recognize objects as standing in symbolic or representational relationships to one another. In order to see a visual mark — such as a pattern of lines scratched on a stone — as a symbol for or representation of, say, a tiger, I must first of all possess the concept *tiger* — that is, I must be able to think of certain objects, even in their absence, as being things *of a certain kind* (in this case, a kind of things which are ferocious, flesh-eating, four-legged, furry and so on). In addition, and even more importantly, I must recognize the visual mark itself as falling under the concept *symbol* (even if I have no *word* for that concept) and thereby likewise as being something of a certain kind — namely, something intentionally produced by a thinking being with a view to representing an object of another kind (in this case, a tiger). The very concept of a symbol is the concept of something designed to represent something of a kind, and thus something falling under a concept — so that any creature possessing the concept of a symbol must thereby possess the concept of a *concept* too, and indeed must conceive of itself and others with whom it communicates by means of symbols as being concept-users. In short, a symbol-producing creature must have something like a 'theory of mind', by which it interprets the behaviour of other such creatures as being expressive of inner thoughts and feelings (see further Whiten 1991). Even primatologists who are much more ready than I am to attribute 'conceptual' abilities to monkeys and apes are hesitant about crediting them with anything like a fully-fledged 'theory of mind' (see Cheney & Seyfarth 1990).

At this point we need to appreciate how very different is the perceptual world of a concept-user from that of an animal incapable of conceptual thought. We are apt to underrate or overlook this difference, partly because it is very difficult for the mature concept-user to imagine what naïve, conceptually uninformed perception must be like — and therefore difficult to imagine how different animal perception must be from our own. As we survey our perceived environment, we unavoidably see it as populated by objects falling under concepts, that is, by objects of certain recognizable kinds (see further Lowe 1989). Here a table, there a tree, yonder a cow standing by a gate — and so on. Sometimes, of course, we notice objects which we cannot easily classify in familiar terms, apart from very general and vague ones: I might ask someone in a house strange to me 'What is that large, shiny cylindrical object in the corner of the room?', and perhaps be informed that it is an old artillery shell-case which is now being used as an umbrella-stand. Undoubtedly, language facilitates such conceptually informed perceptual recognition, though it seems highly unlikely that such recognition is *impossible* without the aid of language. On the contrary, it seems likely that true language — understood as a means for communicating conceptual thought from one thinking creature to another — could only have emerged amongst creatures antecedently capable of conceptually informed perceptual recognition.

What, then, of conceptually *un*informed perception — what I have called 'animal' perception? What does an animal see, if it doesn't see its environment as populated by objects of recognizable kinds? And on what grounds can we deny that animal perception is conceptually informed in the way that human perception is? Here we need to appreciate that to recognize an object as falling under a concept, that is, as being something of a certain *kind*, involves a grasp of certain general and conditional truths (including a criterion of *identity* for objects of this kind: see below). Such a grasp involves far more than a mere ability to *discriminate perceptually* between presented objects of that kind and presented objects of other kinds — an ability which many lower forms of animal life possess (and one which ethologists sometimes extravagantly take to be indicative of concept-possession). Thus, to know that a certain object is a *tree*, say, is to know, amongst other things, that it is a living thing, a plant, that it has leaves, that it is not capable of self-motion, that if it is cut down it will die . . . (the list is long and open-ended).

Because these general and conditional truths involve the concepts of many other kinds of thing, a creature can only recognize an object as falling under a concept if it possesses a whole *system* of interlocking concepts, linked by general and conditional truths which that creature grasps. (By a 'conditional' truth, I mean one which requires the use of the word 'if' for its natural expression in English, such as 'If a tree is cut down, it will die'.) There is no reason whatever to suppose that any non-human animal possesses such a system of concepts. Apart from anything else, there is no reason to suppose that any non-human animal genuinely possesses general or conditional knowledge or beliefs. (For another sceptical assessment of the suggestion that non-human animals possess concepts, in anything like the human sense, see Chater & Heyes 1994.)

So, in answer to the question, 'What does an animal *see*?', we must be careful not to say that it sees the objects which *we* see *as* we see them (that is, as falling under concepts). Of course, an animal may be *visually sensitive* to the presence of a certain object, and may on that account react appropriately (that is, 'adaptively') to it — for instance, by walking around it, sniffing it, chasing it or running away from it. This requires, amongst other things, that an animal be visually sensitive to (though *not* that it be conceptually cognisant of) the *spatial* properties of an object, such as its distance, size, shape and texture, and likewise to its *kinematic* and *dynamic* properties, such as its velocity and weight. Thus the animal's visual experience must, in some sense, correctly represent to it the general spatial layout of its environment as it changes over time, segmenting that environment into distinct parts with respect to which different behaviours are mandated — and these different behaviours, we may suppose, are some of them innate, while others are learned inductively, being reinforced by nature's regime of punishment and reward. But none of this requires us to think of the animal as recognizing *objects* in its environment, in the distinctively human sense of seeing its environment as composed of things falling under various concepts, linked by a system of general and conditional beliefs.

Symbols are, of course, a species of *artefact*. But the production of artefacts as such is not a distinctively human activity, nor one which demands high-level, conceptually informed cognition. Animal artefacts are commonplace: the beaver's dam, the honey bee's comb and the spider's web are just three of the more familiar examples. As Richard Dawkins has urged, we should think of animal life-forms as exhibiting 'extended phenotypes', which include not just bodily morphology but also effects on the wider environment which an animal partially shapes to its own ends (Dawkins 1982). When it is alleged, as it sometimes carelessly is, that apart from human beings only some of the other higher primates are 'tool makers', it should be acknowledged that this assertion requires qualification in the light of the widespread existence of animal artefacts even amongst much lower life-forms. Probably what is intended by this sort of allegation is that only human beings and, perhaps, chimpanzees *intentionally produce* artefacts, designing them deliberately with a specific purpose in view. That human beings do this is evidently true (though whether chimpanzees ever do is more difficult to assess). But then we see that what is cognitively significant about human artefact-production is, once again, that it is indicative of — because it demands — a capacity for *conceptually structured thought*. In order for a creature to design and produce an artefact intentionally, with a specific purpose in view, it must be able to think of objects as falling under concepts. For instance, deliberately to create something with the function of an axe, designed to cut certain kinds of things such as trees, one must conceptualize the objects to be acted upon as objects of a kind suited to the sort of action for which an axe is designed — and this will require the designer to have a complex body of general and conditional beliefs about the objects to be acted upon, as well as about the materials from which something with the properties of an axe can be produced. Likewise with *symbols*, which are just artefacts with a special kind of purpose. What is especially significant, cognitively, about a creature capable of designing symbols, is not just that it must be a concept-user — any creature capable of *designing* an artefact must be that — but that it must possess the very concept of a *concept*, because it must recognize both itself and others in its community as *concept-users*, inasmuch as the concept of a concept-user is involved in a specification of the very *purpose* for which a symbol is designed.

What is beginning to emerge, I hope, from these reflections is that the most significant cognitive transition involved in the evolution of the human mind was the transition to *conceptual thinking*. This transition could not, in my view, have been a multi-staged process: a creature is either capable of thinking in concepts or it is not — there is no half-way house. (This is also plausibly true of the transition to syntactically organized language — which may, of course, be in effect the *same* transition: see Bickerton 1990.) Different creatures may have different *conceptual*

repertoires — some, for instance, may have and some may lack the concept of a *concept*, or that of a *concept-user*. But between true conceptual thinking and an animal's mere sensitivity to features of its environment, coupled with innate and acquired behavioural responses to those features, there is a cognitive gulf of enormous magnitude — a qualitative rather than a merely quantitative difference. Here I take my lead from Immanuel Kant, whose profound insights into the structure of the human mind have still not been adequately absorbed either by philosophers or by psychologists and ethologists (see Kant 1929). The distinctive feature of human cognition lies in its synthesis of the elements of sensory awareness through the application of concepts, thereby at once providing the human mind with *objects* of thought and perception and thought itself with *logical structure*, apt for the deployment of processes of theoretical reasoning. When a human being thinks, he or she has thoughts of objects with properties, or standing in relations to one another, these thoughts often being of a general or conditional form — to use again a now familiar example, one may have the thought, at once general and conditional in form, that any tree, if it is cut down, will die. If one adds to this the singular thought that this object now before me is a tree, one may then infer, logically, that this object will die if it is cut down. However, there is no evidence, I believe, that any creature other than a human being is capable of conceptualized, logical thinking of this order.

On this question of animal inference, chimpanzees are indeed sometimes held to be capable of elementary practical reasoning, appeal being made to examples like that of Köhler's famous chimpanzees, which joined sticks together and used them to rake bananas towards themselves through the bars of their cage, or stacked boxes on top of one another and climbed up them to obtain bananas which were previously out of their reach. However, it is by no means evident that one need ascribe a capacity for general or conditional thoughts to a chimpanzee — nor, hence, a capacity for genuine reasoning — in order to explain such behaviour. We are, regrettably but understandably, apt to anthropomorphize when attempting to explain the apparently intelligent behaviour of animals — saying, for instance, that our pet dog approaches its feeding bowl because it sees food there, feels hungry, and knows that by approaching the bowl it can obtain the food and thereby satisfy its hunger. This rationalistic interpretation of such animal behaviour does not, however, easily survive the results of an ingenious experiment, in which a feeding bowl was attached to a mechanism designed to move the bowl *away* from an animal if the animal approached and *towards* it if the animal retreated: the animals tested consistently failed to make the appropriate adjustment to their behaviour in order to secure the food, putting in doubt the initial appearance of their having a capacity for practical reasoning (see Heyes & Dickinson 1990; 1995). This finding is reminiscent of one of Köhler's less well-known observations: that when one of his chimpanzees was presented with a banana outside its cage, but so situated that the chimpanzee would have to push the banana *away* from itself before raking it in, the animal proved unequal to the task (Cheney & Seyfarth 1990, 276).

I should explain that when I speak of 'objects' falling under concepts or belonging to kinds, I am speaking of things which we think of as being *identifiable* and, indeed, *re*-identifiable as 'the same thing again' — things such as tables, trees, mountains, and people (see Lowe 1989). A creature lacking the concept of numerical *identity* could not think of or perceive its world as being populated by 'objects' in this sense — nor, of course, could it think of *itself* as a subject of experience within that world (see Lowe 1996). (It is important to distinguish here between *numerical* identity and mere *qualitative* identity, or exact similarity: even pigeons can be trained to discriminate perceptually between qualitatively different shapes, such as triangles and rectangles — though, as mentioned above, this by no means implies that they possess the *concepts* of triangularity and rectangularity: see Chater & Hughes 1994.) To see something as a *tree*, say, is to see it as a thing with a past and a (potential) future, that is, as something which can persist identically through time, despite undergoing qualitative changes of various sorts, appropriate to the kind of thing it is. (Philosophers traditionally used the term 'substance' to denote things like this.) Thus, we do not see the loss of its leaves as inimical to the identity, or continuing existence, of a tree, because we conceive of trees as being things of a kind for which such a change is natural. From the fact that human beings perceive their world as being populated by objects, capable of persistence through changes of shape and position, it follows too that they see that world as existing within a unified framework of *space and time* (another Kantian insight). Thus, humans perceive their immediate environment as forming just a small part of a wider framework of interrelated objects, spread out in space and time beyond the 'horizon' of present perception — a feature of human understanding vastly more

sophisticated than the sort of locational recognition capacities attributed (in the form of 'cognitive maps') to pigeons and rats in order to explain their ability to find their way home or to relocate a food source (see Campbell 1994). Hence, humans can form expectations with regard to the future and reflect on past happenings: they can make provision today for tomorrow's needs, and try to make amends today for yesterday's failures. None of this is possible for animals, for which perception is merely a registering of repeatable features (including, no doubt, geographical ones), followed by habituated action. When there is rain, the animal may take shelter; when there is danger, it may flee — but it can have no conception of there being some *one* persisting object which it now sees and may encounter again, perhaps in a changed condition, after a period of absence. (Our deep-rooted temptation to anthropomorphize may incline us to imagine that some animals — especially our pets! — do have such a conception, at least where we ourselves are concerned: but when we see what a sophisticated framework of concepts is presupposed by a capacity to recognize objects *as objects*, this temptation may perhaps be more easily resisted.)

All of these remarks are intended to emphasize how truly vast is the gap between animal and human cognition. Merlin Donald, to his great credit, recognizes the size of that gap and therefore attempts to show how it can have been bridged, not in one fell swoop — for this would be difficult to reconcile with an evolutionary perspective on human cognition — but rather through three successive transitions. However, as I have already remarked, I think that what is distinctive of human cognition — our capacity for conceptual thinking — is an all-or-nothing affair: either a creature has it in full measure (allowing for differences in conceptual repertoire), or else it lacks it altogether. The conceptual capacity which is required for a mastery of true language — understood as a means of communicating conceptual thoughts — is one and the same as that required for the intentional production of visual symbolism, whether in the form of pictorial representations or in the form of writing. And to the extent that 'mimesis' is understood as the intentional re-enactment of events for purposes of communication (as opposed merely to imitative behaviour, of a sort exhibited by many lower animals), then it, too, demands precisely the same conceptual capacity for object-recognition and so forth. It is unsurprising, then, that no human or animal community has ever been discovered to possess one of these behavioural traits — mimesis, language and the production of visual symbolism — without the others.

One thing which, I feel, may blind modern cognitive scientists to Kant's insights about the structure of the human mind, and which may in consequence deceive them into imagining that the problem of explaining the evolution of the human mind is easier than it really is, is the current fashionability of *information-processing* or *computational* models of human cognition. So long as the human mind/brain is thought of merely as an information-processing device, analogous to a digital electronic computer, Kant's insights about the conceptual structure of human thought threaten to go unheeded. A computer can process vast amounts of information, but clearly doesn't need to possess *concepts* in order to do this. (The computer's *designer* and *programmer* must possess them, of course, if their work is to be the product of deliberate thought and planning: and the computer's *output* is only of use to someone who can interpret its computations by means of conceptually informed thought.) If one sees the human brain merely as a biological computer, then, one will be apt to see differences between it and animal brains as residing merely in such factors as speed of processing and memory capacity. The qualitative difference between animal cognition and the sort of conceptual thinking engaged in by humans will be lost to view. For the technical notion of 'information', as deployed in computer science, is entirely insensitive to issues concerning concept possession and conceptual structure. What is stored on the hard disk of my computer, in the form of patterns of magnetized particles, is indeed 'information' in this technical sense. In just the same sense, one may say that the pattern of rings in a cross-section of a tree trunk contains 'information' — in particular, information about the age of the tree and about the weather conditions it endured at various times in its life. But, of course, the tree itself does not have to possess the concept of *age* or of *weather conditions* — nor, indeed, *any* concept whatever — in order to store this information. By contrast, a human being who *believes* — perhaps as a result of counting the tree's rings — that the tree has such-and-such an age must indeed possess the concept of *age* in order to have such a belief. Belief is a conceptually structured state of mind, not merely a state of 'information storage'.

These remarks have implications for the very notion of 'external symbolic storage' (ESS), for that notion is evidently closely related to the computational notion of 'information storage'. Precisely because a page of a book, like the hard disk of a

computer, 'stores information' in a sense which is radically different from the sense in which human beings *possess knowledge*, or *beliefs*, we should not take too literally the idea of ESS as being some sort of adjunct to, or extension of, the human mind — in short, we should be extremely wary of Donald's heady talk of 'the emergence of visual symbolism and external memory as major factors in cognitive architecture' (Donald 1991, 17). The notions of 'external memory' and 'cognitive architecture' that are being invoked here are ones drawn from computer science and the related computational conception of the mind. If the human mind/brain *could* be adequately described merely as an information-processing device, then indeed it would make perfect sense to think of that device as capable of having its computational capacities 'upgraded' by 'connecting it up' to external devices of various sorts, such as an abacus or, more ambitiously, an electronic computer. But I want to resist, for Kantian reasons, the very metaphor of the mind/brain as being a computational or information-processing device (see also Lowe 1995). A book, an abacus, an electronic computer — all of these human inventions certainly *are* aids to cognition. But that is all they are — *aids* — not *extensions*. The difference is the difference between a walking stick and a motor car: the stick aids us in *walking*, whereas the car extends our ability to move by providing us with a new means of locomotion. The book, abacus or computer may help us to *think* more efficiently, but using it doesn't *constitute* a mode of thinking unavailable to us without it, in the way that using a motor car constitutes a hitherto unavailable mode of locomotion. And the reason for this is that true, conceptual thinking is required to interpret the very 'input' and 'output' of a book, abacus or computer: nothing that resides in the structures of these devices themselves bears any relation to genuine *thought* save through the interpretational efforts of a thinking human user of them (*cf.* Searle 1992).

A final question is this: if the gulf between human conceptual thinking and animal cognition is as great as I have been suggesting, how *can* the bridging of that gap in human prehistory be explained in evolutionary terms? The answer is that I simply do not know. It may even be that we are constitutionally incapable of answering a question like this (a case of what has sometimes been called 'cognitive closure': *cf.* McGinn 1991). Our thought is conceptually structured: we think of the world as populated by objects falling under concepts. Accordingly, our scientific theories, including the theory of evolution itself, are themselves conceptual structures. (I do not in the least mean to call into question their *truth* on this account — on the contrary, a scientific theory *can* only be true because it is a logical structure of concepts, since truth and falsehood are predicated precisely of such structures.) But now we want to know how the emergence of conceptual thinking can be explained, *scientifically*, that is, in terms which presuppose the very structure of conceptual thought whose origins are now in question. This looks suspiciously like trying to pull ourselves up by our own bootstraps!

E.J. Lowe
Department of Philosophy
University of Durham
50 Old Elvet
Durham
DH1 3HN

Note

1. There is, of course, physical evidence of changes in the structure of the human vocal tract, preserved in the fossil record (Lieberman 1984; 1991), but the mere capacity to vocalize in a modern human way by no means points conclusively to a modern human capacity for spoken language.

References

Bickerton, D., 1990. *Language and Species*. Chicago (IL): University of Chicago Press.

Campbell, J., 1994. *Past, Space and Self*. Cambridge (MA): MIT Press.

Chater, N. & C. Heyes, 1994. Animal concepts: content and discontent. *Mind and Language* 9, 209–46.

Cheney, D.L. & R.M. Seyfarth, 1990. *How Monkeys See the World: Inside the Mind of Another Species*. Chicago (IL): University of Chicago Press.

Davidson, D., 1984. Thought and talk, in *Inquiries into Truth and Interpretation*, by D. Davidson. Oxford: Clarendon Press, 155–70.

Dawkins, R., 1982. *The Extended Phenotype*. Oxford: Oxford University Press.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Fodor, J.A., 1983. *The Modularity of Mind*. Cambridge (MA): MIT Press.

Heyes, C. & A. Dickinson, 1990. The intentionality of animal action. *Mind and Language* 5, 87–104.

Heyes, C. & A. Dickinson, 1995. Folk psychology won't go away: response to Allen and Bekoff. *Mind and Language* 10, 329–32.

Kant, I., 1929. *Critique of Pure Reason* [1787], trans. N. Kemp Smith. London: Macmillan.

Lieberman, P., 1984. *The Biology and Evolution of Language*. Cambridge (MA): Harvard University Press.

Lieberman, P., 1991. *Uniquely Human: the Evolution of Speech, Thought and Selfless Behavior*. Cambridge (MA): Harvard University Press.

Lowe, E.J., 1989. *Kinds of Being: a Study of Individuation, Identity and the Logic of Sortal Terms*. Oxford: Blackwell.

Lowe, E.J., 1995. There are no easy problems of consciousness. *Journal of Consciousness Studies* 2, 266–71.

Lowe, E.J., 1996. *Subjects of Experience*. Cambridge: Cambridge University Press.

McGinn, C., 1991. *The Problem of Consciousness: Essays Towards a Resolution*. Oxford: Blackwell.

Olson, D.R., 1994. *The World on Paper: the Conceptual and Cognitive Implications of Writing and Reading*. Cambridge: Cambridge University Press.

Searle, J.R., 1992. *The Rediscovery of the Mind*. Cambridge (MA): MIT Press.

Whiten, A. (ed.), 1991. *Natural Theories of Mind: Evolution, Development and Simulation of Everyday Mindreading*. Oxford: Blackwell.

Chapter 9

The Supernatural Beings of Prehistory and the External Storage of Religious Ideas

Steven Mithen

Depictions of what are most probably supernatural beings provide some of the most intriguing images that we find in prehistoric art. While they confirm our suspicions gained from other sources of data that past people possessed religious ideologies as complex as those in the world today, such images rarely provide any substantial information about the nature of those prehistoric ideologies. Is it possible to make any generalizations about supernatural beings that can be applied to those of prehistory?

The nature of prehistoric art appears to confirm Durkheim's view that the principle forms of art seem to have been born out of religion. Why should this have been so? People possess all sorts of complex ideas which they do not feel compelled to represent in material form, the very nature of which seems to contradict the immaterial notion of a supernatural being.

It is argued that once we view the human mind from an evolutionary perspective, and recognize religion as a product of recent cognitive fluidity, we can indeed make generalizations about likely features of past supernatural beings. Moreover we can understand more fully why religious ideas so frequently need to have material manifestations this is to help anchor them into a mind which has no natural home for ideas that cross-cut evolved domains of knowledge.

The archaeological record has many works of art that are likely to be representations of supernatural beings from long forgotten religions. What can we know of such beings? 'Very little' is both the common sense and probably correct answer. But the archaeological record also prompts another, rather more interesting, question: why are material symbols so fundamental to religious ideas and ritual? For as Durkheim (1915, 381) once suggested, and as Palaeolithic archaeology can now demonstrate, 'the principle forms of art seem to have been born out of religious ideas'. This paper will address the question of why material symbols are so prevalent in religious ideas. In doing so, it will also suggest that it may be possible to make some educated guesses about aspects of the supernatural beings of prehistory beyond those evident in the paintings and sculptures of the archaeological record.

Why should material symbols be so fundamental to religious ideas and ritual? To argue that we convert religious ideas into material objects to give them relative permanence so that they can be subjected to operations which are beyond the capacity of the mind (Leach 1976, 37) simply begs the question. Each of us possesses a vast array of ideas on which we perform complex mental operations without needing to convert those ideas into material form to do so. We have, for instance, ideas about social relationships, about what other people are thinking, and about future events in our minds. But rarely do we create material symbols to help us form and manipulate such ideas. So why do religious ideas require such different treatment? Why do they require 'external symbolic storage'?

External symbolic storage as a solution to the quantity of information

External symbolic storage as a solution to information overload on our minds is an appropriate interpretation for written documents or CD-Roms. As Donald (1991) discussed, the existence of such 'artefacts' creates real problems as to the locus of human memory. Their emergence is likely to have changed — and perhaps continues to change — the manner in which the mind works.

Some features of early prehistoric art may can also be interpreted as relating to the quantity of information requiring storage and transmission. Images of animals within Palaeolithic cave paintings, for instance, may have functioned to cue the recall of ecological knowledge and have prompted the creative use of that knowledge in decision making (Mithen 1988; 1990). The species that were painted, and a range of stylistic attributes of the paintings, seem to relate directly to the knowledge of these animals that the Ice Age hunters required, and the means by which it was attained. Information was not being encoded into these images; they were acting as recall cues for the information stored within the human mind, and as stimuli for the creative processing of that knowledge when making hunting decisions. This art appears to have been created principally at a time of economic stress when the quantity of information and the quality of decisions were at a premium (Mithen 1989). Indeed, the recently established thematic changes in Palaeolithic art through time (Clottes 1996) suggest that such retrieval cues in the art were becoming more prevalent as climatic conditions deteriorated towards the late glacial maximum and economic stress increased; they were culturally selected.

Engraved objects from the Upper Palaeolithic which have the repeated use of similar motifs are also likely to have functioned as retrieval cues, and possibly for storing information in a similar fashion as occurred within the first writing. Such artefacts have been characterized as 'artificial memory systems' (d'Errico 1995) and are appropriately described as examples of prehistoric science, rather than art. Classic examples of these are the La Marche antler and the Taï plaque (Marshack 1990; d'Errico 1995; d'Errico & Cacho 1994). It remains unclear what information was being encoded on such objects, but again it is likely to have been of a utilitarian nature relating to the social and natural world. As with the cave paintings of animals, one can readily appreciate (if perhaps not always understand) how the appearance and then loss of such artefacts in the archaeological record directly related to changing social and economic circumstances.

Artefacts which relate directly to religious ideas lack any utilitarian explanation. They appear so prevalent in human societies that their presence cannot be explained by information overload on the human mind — unless that overload is universal. Belief in religious ideas appears ubiquitous, as does the need to express such ideas in material symbols. Why should religious ideas require external symbolic storage? To address these questions we must consider the origin of religious ideas, and indeed the evolution of the human mind in general.

The origin of religious ideas: archaeological evidence

Religion is a notoriously difficult domain of activity to define. Seeking its archaeological traces poses enormous problems. While the diversity of religious beliefs defies attempts to identify universals, certain recurrent features of religions exist and indicate the type of evidence we as archaeologists must seek. Five features appear to be of greatest significance: (1) belief in non-physical beings; (2) that non-physical component of a person may survive after death; (3) that certain people within a society are likely to receive direct inspiration or messages from supernatural agencies, such as gods or spirits; (4) that performing certain rituals in an exact way can bring about change in the natural world; (5) the use of material symbols (see Boyer 1994; Guthrie 1993; Park 1994, 32–9 for discussion of attempts to define religion and identify universals).

Colin Renfrew (1985) has discussed the formidable problems that archaeologists face when attempting to identify past religious activity and when trying to draw inferences regarding religious ideas. He quite rightly warns against being either unduly pessimistic or immodestly optimistic about our abilities at these tasks. With regard to early prehistory (i.e. before farming) the last decade has seen a rigorous re-examination of the evidence for ritual, which has resulted in the rejection of much of the claimed evidence. The development of our understanding of taphonomy has led to the dismissal of Neanderthal bear cults, cannibalism , and grave ritual involving the placement of flowers at Shanidar (Gargett 1989; Gamble 1989; White & Toth 1991).

In contrast to the view that 'primitive thought' was originally religious in nature, the archaeological evidence clearly indicates that religious ideas and

ritual activities appeared relatively recently in human prehistory. They are first found associated with anatomically modern humans not more than 100,000 years ago.

This evidence comes from the archaeological record of the earliest modern humans in the Near East. In the caves of Qafzeh and Skhūl in the Near East burials of anatomically modern humans have been found. They date to between 100,000–80,000 years ago and in some of these graves parts of animals were placed with the human bodies. In Qafzeh, a child was found buried with the skull and antlers of a deer (Vandermeersch 1970), while in Skhul one of the burials had been laid on its back and the jaw bone of a wild boar placed within its hands (McCown 1937). Three things should be noted about these burials. First, the associations between animal parts and human bodies have been critically examined in recent years following claims that they are fortuitous — the mere result of post depositional processes (Lindly & Clark 1990). Such claims have been rejected and there seems little doubt that parts of animals were intentionally placed within these graves. Secondly, artificially made symbols appear to be absent from these societies, neither placed within the graves nor worn on the bodies themselves. As much as 60,000 years appears to have elapsed after first fossil evidence of anatomically modern humans before any symbols were manufactured. Thirdly, Neanderthals also seem to have been creating graves during this time period, or very soon after (Gargett 1989; Bar-Yosef *et al.* 1992). But — with one possible exception — these lack any grave goods at all, and indeed any signs of burial ritual. The one exception is the recently excavated Neanderthal infant from Amud (Rak *et al.* 1994; Hovers *et al.* 1995). Known as Amud 7, the degree of preservation of this infant implies that it was a burial, and a red deer maxilla was found lying on the pelvis. Currently undated, the location of this burial in the cave suggests a relatively recent date, i.e. younger than 60,000 bp.

This admittedly scanty evidence implies that animals were playing a symbolic role in the society of modern humans (and perhaps the late Neanderthals), in addition to their utilitarian role of supplying food and raw materials. I suspect that we are seeing here the origins of totemic and anthropomorphic thinking in the human mind, something that remained absent from the majority of early humans (Mithen 1996a). If parts of animal bodies were being used as symbols by the first modern humans, then the lack of any artistic representation is perhaps surprising. Only in South Africa at this time are significant traces of artistic activity. These take the form of an increase in pieces of red ochre in archaeological contexts after 100,000 years ago (Knight *et al.* 1995). The implications of this increase remains unclear, though body painting is a likely explanation. But there are no representational images and the evidence for any symbolic activity prior to 40,000 years ago is sparse and highly ambiguous (but see Bednarik 1995; Mithen 1996b). Only after this date does the archaeological record contain images of anthropomorphic beings and body ornaments which are likely to both represent and create the symbolic relationships with the natural world — relationships that had perhaps existed since the time of the first modern humans.

The very first art we possess appears to be intimately associated with religious ideas by containing images of what are likely to be supernatural beings. The earliest piece is a 28.1 cm high carving in mammoth ivory of a figure half man and half lion from Höhenstein Stadel and dating to *c.* 33,000 years ago (Marshack 1990). Contemporary with this are the paintings in Chauvet Cave which include a half human/half bison figure (Chauvet *et al.* 1996). Such anthropomorphic figures persist in Palaeolithic art even as the major animal themes change from carnivorous/dangerous animals to herbivores. In Les Trois Frères, for instance, there is the famous sorcerer figure, probably dating to 15,000–12,000 years old. It appears to have the posture, legs and hands of a human, the antlers of a reindeer, the tail of a horse and the phallus in the position customary in of a feline. As we move beyond the Palaeolithic, anthropomorphic figures continue to be a critical part of the archaeological record, such as the human/fish images from Lepenski Vir (Srejović 1972). And during later prehistory figurative images pervade prehistoric art which are most readily interpreted as images of supernatural beings (Gimbutas 1974).

It is also likely that many of the non-figurative images from prehistory relate to supernatural beings and religious ideas, since geometric forms are used to represent religious ideas by ethnographically documented groups. In Yolunga art, for instance, Ancestral Beings may be figuratively depicted, but their transformational aspects (the manner in which they can exist in different states such as human, animal or landscape feature) are principally depicted in a geometric fashion. The multivalency of these designs enable the paintings to encode the transformational aspect of Ancestral Beings and events (Morphy 1989).

A more familiar example of a multivalent abstract image encoding ideas about supernatural beings is the Christian cross used as a symbol of the crucifixion and consequently the resurrection of Jesus. It is a distinct possibility, or even probability, that the abstract images from prehistory, such as those cut into limestone blocks 30,000 years ago in France (Delluc & Delluc 1978), or much later in prehistory on the stones at New Grange (O'Kelley 1982), also encode information about supernatural beings, a mythological world and religious ideas.

In summary, there can be little doubt that after 30,000 years ago religious ideas, ritual activity and material symbols pervade all human societies. Even though the meanings associated with figurative or abstract images cannot be inferred, there can be little doubt that the majority of this art related to religious ideas. Why should there be such a compulsion to represent religious ideas in material form? After all, to do so is in essence a contradiction of the ideas themselves: turning something that is eternal and supernatural into something that is transient and material. To answer this we must consider the cognitive origins of religious thought.

Cognitive origins of religious ideas

In this section I will briefly summarize my own arguments for the origin of religious ideas, recently discussed at length elsewhere (Mithen 1996a), and which have significant similarities with the ideas of Boyer (1993; 1994; 1996) and Guthrie (1993). In our work the critical feature of supernatural beings is that they possess features which cross-cut the 'natural' categories of entities in the world. For instance, a supernatural being may be able to transform itself into many different species, although species in the natural world are immutable. In this sense it is like an artefact, which can be easily transformed into different types of tool. Supernatural beings may have a body like a human, but be invisible, just as an idea is invisible. Supernatural beings may need to eat in the manner that humans need to eat, but do not undergo the normal processes of birth and death. In that respect they are more like inert physical and seemingly timeless objects, such as a piece of stone.

In this regard, I have argued that the origin of religious ideas and conceptions of supernatural beings is just one manifestation of a transformation in human cognition that occurred between 100,000 and 30,000 years ago. Before that time the human mind appears to have had a domain specific character: early humans could think in essentially modern ways about numerous domains of activity, such as social interaction, tool-making and the natural world, but were unable to integrate ways of thinking and knowledge from these separate domains (Mithen 1996c). Elsewhere I have traced the evolution of these cognitive domains and explained how their isolation from each other is both compatible with our understanding of cognitive evolution, and serves to explain various features of the Lower and Middle Palaeolithic records (Mithen 1996a). For instance, early human technology remained limited in scope and complexity as the knowledge of animal behaviour could not be brought into contact with technical knowledge for the design of hunting weapons. Social complexity remained limited as this could not be mediated through material culture as is the case among modern humans. With the emergence of anatomically modern humans, a cognitive transition began in which new ideas could arise by combining knowledge which had previously been domain-specific.

As Edmund Leach (1976) described, the ability to associate together entities either material or abstract, which ordinarily belong to quite different contexts, is the essence of symbolism. He uses the example of the 'lion as king of the beasts' which requires mixing two contexts in the mind : the lion as a beast and the king as the most powerful man in a society, ideas which ordinarily remain in the contexts of 'society' and 'nature' (a rather pertinent example, by chance, in light of the lion/man from Höhlenstein Stadel). Similarly, conceptions of supernatural beings bring together ideas that ordinarily reside in contexts of 'physical objects', 'humans', 'society', 'nature' in an almost bewildering diversity of ways

The archaeological record implies that this transition from a domain-specific to a 'cognitively fluid' mentality occurred in two major steps (Mithen 1996a). The first was the bringing together of knowledge and thought about the social and natural worlds, exemplified in the evidence for totemism and anthropomorphic thinking among the earliest modern humans by 100,000 years ago (Mithen 1996d). At this time, knowledge and thought about material culture ('technical intelligence') appears to have remained as an isolated cognitive domain, demonstrated by the absence of artefacts within the burials, and the continuation of a Middle Palaeolithic technology by the early modern humans.

By being able to integrate ideas and knowledge from the two evolved domains of natural history and social intelligence people could, for the first time, attribute human-like thoughts to animals, and believe that they shared ancestors with specific animal spe-

cies. A mapping could be created of the social world onto the natural world, and *vice versa*. But as the domain of technical intelligence remained isolated, such ideas lacked material expression. And it would appear unlikely that such early religious thinking could have involved animism, attributing thoughts to inert physical objects. These could only have arisen through the integration of technical knowledge into the incipient cognitively fluid mind. This appears to be the fundamental cause of the cultural explosion between 60,000–30,000 years ago as this enabled religious ideas to have material expression. We see the consequence in the archaeological record with the appearance of images such the lion/man from Höhenstein-Stadel. Similarly it is likely that many of the material objects, including those used for personal decoration, now carried symbolic meaning.

So we see that the first inklings of religious ideas arose 100,000 years ago as the domain-specific mentality that had been characteristic of the early human mind began to collapse. While considerable functional utility was gained from a cognitively fluid mind, such as the increased use of food in mediating social relationships, the emergence of religious ideas is most likely no more than an epi-phenomenal consequence of this cognitive transition.

Religious ideas as violations of intuitive knowledge

The critical feature of the religious ideas that arise from the cognitively fluid mind, as possessed by all modern humans, is that they involve ideas which contradict our intuitive understanding of the world. To explain this we need to briefly consider some recent work in child development. Just as cognitive evolution appears to have involved a period in which thought was domain-specific in character, so too does cognitive development in young children (Hirschfeld & Gelman 1994). This is a controversial area of research, but there appears to be substantial evidence that among young children an intuitive understanding of psychology, physics and biology emerges within their minds (e.g. Whiten 1991; Leslie 1994; Atran 1990; Spelke 1991). These domains of intuitive knowledge appear to be universal, underdetermined by experience and, for a short period of development, related to domain-specific ways of thought. I believe they relate to the domain-specific cognitive domains that arose during human evolution (Mithen 1996a). This intuitive knowledge appears to act as the building blocks for cognitive development: it 'kick-starts' other cognitive domains which are culturally specific, and by the age of three, children appear very able to integrate their knowledge from different domains, or create 'mappings across domains' (Karmiloff-Smith 1992; Carey & Spelke 1994; Harris 1994). Older children and adults can come up with ideas that violate their intuitive understanding of the world, for example by attributing thoughts and desires to inert pieces of moulded plastic (i.e. dolls).

Pascal Boyer (1993; 1994; 1996) has stressed this in his recent work, arguing that religious ideas about supernatural beings characteristically involve such violations. Supernatural beings are frequently thought of as being able to defy the laws of physics by effortlessly moving through physical objects or walking on water; they may not need to feed or undergo the 'normal cycle of birth, reproduction and death'. They may be able to transform themselves into other animal species, or into humans or into physical features of the landscape. Boyer provides a host of no less bizarre examples from other religions: trees that can talk, mountains that can breathe. Such features of supernatural beings arise from cognitive fluidity — bringing together knowledge and ideas from different cognitive domains.

Boyer argues that such violations to our intuitive understanding of the world are essential to the cultural transmission of religious ideas so as to make them attention-grabbing: they are something different, something special, something to be treated with reverence.

The same argument can apply in an evolutionary context. Early humans such as Neanderthals are likely to have had a profound understanding of the natural world, and of physical objects — as apparent from their foraging behaviour and tool-making. They were as adept at mind-reading and complex social behaviour as ourselves. But their domain-specific mental architecture, which unlike modern humans, continued into adulthood, prevented the 'mappings across domains' and the development of ideas which violated their understanding of physics, biology and psychology. Believing that inanimate objects may have beliefs and desires, or that humans could once transform themselves into animals — beliefs that are recurrent in many religious ideologies — was beyond them. This only arose with the emergence of cognitive fluidity, in the two stages at 100,000 and 60,000–30,000 I described above. And just as Boyer has described for the modern world, it is likely that these violations to intuitive understanding of the world gave the religious ideas of the first modern humans a special salience.

Religious ideas as susceptible to corruption and dissipation during cultural transmission

Such violations to our evolved understanding may draw our attention to religious ideas, but they also make such ideas transient, difficult to comprehend and to transmit. This is because they do not relate to an evolved feature of mental architecture. In an evolutionary context they do 'fit' into the domain-specific cognitive domains, and in a developmental context they do not 'fit' into a domain of intuitive knowledge. As such, they contrast with other types of ideas. For instance, transmitting knowledge about human social relationships is relatively easy, as all human minds appear to have an intuitive grasp of how social relationships work and what kinds exist, which can be readily understood owing to the long evolutionary history of a distinct social intelligence (Humphrey 1976; Byrne & Whiten 1988; 1992; Mithen 1996a). In other words, we can readily assume that other individuals will share a substantial amount of our own knowledge and assumptions about social behaviour irrespective of their cultural context of development. This makes communication about this domain relatively easy. If, for example, you were told that two people were 'in love', then you could readily infer numerous aspects of their feelings and likely behaviour patterns, irrespective of their cultural context.

Religious ideas are in total contrast to this: there is no domain-specific basis to religious ideas, they are subject to immense diversity, there can be no assumptions that other individuals will be able to grasp the ideas that one possesses. As a consequence the cultural transmission of religious knowledge is fundamentally different to — fundamentally more difficult than — that of social knowledge. Rather than being informal, it is often undertaken in the context of ritual: ordered sequences of action, rigidly adhered to, which serve to maintain the fidelity of the ideas during cultural transmission. Without this, religious ideas would too readily become corrupted and dissipated. But even with the bulwark of ritual, religious ideas are 'winnowed' by the process of cultural transmission; those which survive are those which can most easily find an 'anchor' in the human mind.

The 'anchoring' of religious ideas into the mind

Pascal Boyer has drawn on this inevitable winnowing of religious ideas to explain certain recurrent features of supernatural beings. He argues that the religious ideas which are most likely to survive cultural transmission are those anchored onto one of the domains of intuitive knowledge within the mind. So while they need to violate some aspects of our intuitive knowledge of the world to have salience, they also need to conform to some aspects of this to have survival value. And conformity to our domain of intuitive psychology appears of particular significance, as this is the richest of our domains of inference.

As a consequence, although supernatural beings are often able to move through physical objects, and are invisible or eternal, they nevertheless frequently have beliefs and desires just like any mortal human. As such, people readily may draw inferences about supernatural beings from the partial evidence about them which they receive during the cultural transmission of religious ideas. As Boyer notes, anthropologists have been less prepared to describe these conformities to intuitive psychology than the violations to intuitive knowledge.

The Ancestral Beings of the Aboriginal dreamtime (Morphy 1989) provide us with an excellent example of supernatural beings which both violate and conform to intuitive knowledge of the world. They grab one's attention because they can transform their physical form from animals to humans and topographic features, and because they are not born, and do not live and die like mortal beings. Yet their behaviour often involves practicalities — they fish and hunt and, more significantly, they have beliefs, desires and engage in mental manipulation of others by playing tricks. In this regard they are very human-like. Consequently, when people are hearing about the Dreamtime, there is a substantial element of the mythology that is easy to grasp, allowing them to generalize about the nature of Ancestral Beings from specific examples of their behaviour. Another readily appreciated example is the gods of ancient Greek mythology, which have both supernatural powers and very human-like minds, displaying a belief-desire psychology.

Stewart Guthrie (1993) has also emphasized the very human like-features of supernatural beings in many, if not all, religions: 'For most people, gods and humans are very similar . . . In various cultures gods eat, drink, make war and love, have offspring, fall sick, grow old and die, very much as humans do' (1993, 178). Guthrie illustrates this with many of the major religions of the world. He illustrates, for instance, how in the Bible the Christian god is shown as human-like, both mentally and physically. He has human-like emotions such as anger, love and vengefulness, while in the New Testament he adopts human form in Jesus. Similarly, in the Jewish tradition, God 'wants, cares, demands, regrets, says and does — just

like human beings' (1993, 180), and in Hinduism gods and humans are both similar and continuous.

Gods in other religions simply live in a similar fashion to humans. Quoting Erland Ehnmark, Guthrie describes how the Copper Eskimo great spirit, Kannakapfaluk,

> lives in a snow hut just like the Eskimos, with a lamp and sleeping platform and all the household paraphernalia. Similarly, the Hittite gods 'eat and drink [and] feel hunger. They work as craftsmen. They are liable to afflictions and employ magic to ward off sickness. They have horses and chariots. They keep harems. they assemble in a council to deliberate. They have human passions. They wage wars against the gods of other peoples. (Guthrie 1993; 1991).

In summary, while Guthrie emphasizes the possession of general human-like qualities, and Boyer of a belief-desire psychology, both of these anthropologists recognize that many features of supernatural beings conform to our intuitive knowledge of the world. They are like normal human beings. By having these features they become anchored in the human mind.

Boyer argues that it is the combination of both violation and conformity to different features of intuitive knowledge that provides religious concepts with their greatest survival value during the process of cultural transmission. There is, he argues, a 'cognitive optimum' — ideas which have the right balance of violations and conformities to intuitive knowledge are the ones most likely to survive the rigours of cultural transmission. Too many violations and the ideas are too difficult to grasp, remember, understand and explain; too many conformities and they lack adequate salience, they do not grab one's attention.

Implications for the supernatural beings of prehistory

This argument is of considerable interest for archaeologists. We are frequently faced with evidence that some features of religious ideas did indeed survive for very long periods during prehistory, through a host of social and economic developments. I remarked above on the man/animal figures in Palaeolithic art that are present throughout the 20,000 year period of cave painting, even though other themes in the art are changing. If these are indeed representations of supernatural beings, the means by which they violate intuitive knowledge are apparent: they are composed of different species, perhaps reflecting abilities at transforming themselves between these. But if Boyer is correct, to have had such survival value, these beings must have balanced such violations with conformities. Perhaps they possessed a human-like belief-desire psychology. Similarly, when we consider later prehistoric Europe, there appear to be many points of contact between images we assume to be supernatural beings from the Palaeolithic, and those found in the Neolithic (Gimbutas 1974), and then from the Aegean Bronze Age into classical Greece (Renfrew 1985). If these do reflect the long-term survival of religious ideas, then those ideas may also have possessed Boyer's 'cognitive optimum' to have survived.

So if we return to the question I asked at the start of this paper — what can we know of the supernatural beings of prehistory — we may feel confident that they shared many features of normal humans, whatever the form in which they are manifest to us in the items of prehistoric art.

Artefacts, cognition and religious ideas

By endowing religious ideas with features that conform to our intuitive knowledge they are anchored in the human mind. But there is a second, and perhaps far more significant, way in which religious ideas are anchored: they are represented in material form. Since the time of the very first members of *Homo*, people have manipulated and thought about physical objects. Humans may not be the only species that makes tools, but there is a vast gulf between the role of material objects in the life of even the earliest *Homo* and the other major tool using species, the chimpanzee. Indeed, I suspect that the manufacture and use of tools by *Homo* and chimpanzees derives from very different cognitive processes (Mithen 1996a).

Early humans are likely to have possessed a domain of technical intelligence, which was isolated from the rest of the mind for a large part of human evolution. Young children appear to exhibit an intuitive understanding of physics and the behaviour of physical objects, under-determined by their experience. So religious ideas that are represented in material form gain survival value for the process of cultural transmission: they become easier to communicate and comprehend as their material form provides a second anchor in the human mind.

Representation in physical form provides a means whereby those features of supernatural beings that violate intuitive knowledge may themselves be anchored in the mind, rather than having to ride upon the back of the human-like features of supernatural beings. In other words, we should expect representations of supernatural beings to stress the intuitive knowledge violations (rather than conformities) of those beings. A few examples will illustrate

that this appears to be the case.

If we consider Christian iconography the two most prominent images are the crucifixion, often represented just by the cross, and the Virgin Mary. Both of these are cuing the recall of the intuitive knowledge violations of Jesus, the supernatural being. In other words they stress the manner in which Jesus violates normal processes of death and birth (i.e. by being resurrected, and coming from a virgin birth). In his study of Anglo-Saxon illuminated manuscripts, Gameson (1995) has provided an evocative image of how such representations functioned in private devotion. He describes how the image of the crucifixion in the *New Minster Prayer Book* served as a focus for devotion, as the devotees directed their attention at different parts of Christ's body as they conducted their sequence of prayers. The image stressed the manner in which Jesus violates one's intuitive knowledge of the world. The manner in which Jesus conforms to this knowledge was not necessary as such knowledge is readily acquired, remembered and understood — or as Boyer (1996) describes, it is 'activated by default'.

For a second example we can consider the representation of deities in the Hindu religion. Although, as Guthrie (1993) describes, these often have human-like attributes, they are always represented in anthropomorphic form, except Siva who was represented by the *linga* (a round-topped pillar representing his phallus). In other words, the images depict the features of the deities which violate our intuitive understanding of the world; they often have multiple arms or legs and are composed of several animals. Strict rules exist as to how each deity can be represented. Fuller (1992) describes one role of these images. When Hindus visit a temple one of the most important things they can do is simply gaze on the image for a 'sight' a *darshana*, of the deity. The *darshana* is in fact an exchange of visions, as the deity is thought to be also gazing back as the devotee. So, just as in the previous example, it is the manner in which the supernatural being violates intuitive knowledge that is evoked in the mind. The other, human-like features, require no such cues.

Many more examples can be readily found. The general point is that the images of supernatural beings, represented in a fashion that specifically relates to the manner in which they violate intuitive knowledge, provide anchors for these religious ideas in the human mind. This allows the ideas to be acquired, recalled, understood and transmitted, supplementing the manner in which this is achieved by such other features as the ideas possess which conform to intuitive knowledge. Faulstich summarizing the role of art among the Walpiri of the central Australian desert, expresses this most clearly:

> Among the Walpiri, the natural world is visualised in terms of totemic features and mythological histories. The art makes those unseen realities tangible and remind the people of their tribal origins and religious obligations. . . . When a people's relationship with the spiritual is made tangible, pertinent concepts can be transmitted easily and easily appreciated. The Walpiri excel in employing symbols to communicate and comprehend an intricate belief system. (Faulstich 1992, 22)

Summary

Religious ideas find external storage in material form. This is not because of the *quantity* of information involved, but the *kind* of information. The evolutionary history of the human mind makes religious ideas inherently difficult to comprehend and transmit. Ritual is used to avoid corruption and dissipation of the ideas. But, over the long term, religious ideas are winnowed, some having greater survival value than others. Those which survive are those which can be anchored in the human mind. Boyer explains that one type of anchoring is where ideas have a component that conforms to our intuitive knowledge of the world. Consequently, as he and Guthrie explain, a recurrent feature of supernatural beings is that they have very human-like characteristics, particularly possessing a belief-desire psychology. If this is so, we may be entitled to attribute such characteristics to the supernatural beings of prehistory about whom we have no knowledge, other than from the images surviving in the corpus of prehistoric art.

Such material images are critical, since they provide a second means by which religious ideas are anchored in the human mind. And it is characteristic of such images that they depict the manner in which supernatural beings violate our intuitive knowledge of the world. These features need external storage: although the cognitively fluid mind is very well suited to inventing supernatural beings with such features, it is not well suited to understanding, remembering, and transmitting these religious ideas.

Steven Mithen
Department of Archaeology
University of Reading
Whiteknights
P.O. Box 218
Reading
RG6 6AA

References

Atran, S., 1990. *Cognitive Foundations of Natural History: Towards an Anthropology of Science*. Cambridge: Cambridge University Press.

Atran, S., 1994. Core domains versus scientific: evidence from systematics and Itza-Maya folk biology, in *Mapping the Mind: Domain Specificity in Cognition and Culture*, eds. L.A. Hirschfeld & S.A. Gelman. Cambridge: Cambridge University Press, 316–40.

Bar-Yosef, O., B. Vandermeersch, B. Arensburg, A. Belfer-Cohen, P. Goldberg, H. Laville, L. Meignen, Y. Rak, J.D. Speth, E. Tchernov, A-M. Tillier & S. Weiner, 1992. The excavations in Kebara Cave, Mt Carmel. *Current Anthropology* 33, 497–551.

Bednarik, R.G., 1995. Concept-mediated marking in the Lower Palaeolithic. *Current Anthropology* 36, 605–34.

Blurton-Jones, H. & M.J. Konner, 1976. !Kung knowledge of animal behaviour. In *Kalahari Hunter-Gatherers*, eds. R. Lee & I. DeVore, Cambridge (MA): Harvard University Press, 326–48.

Boyer, P., 1993. *The Naturalness of Religious Ideas, a Cognitive Theory of Religion*. Berkeley (CA): University of California Press.

Boyer, P., 1994. Cognitive constraints on cultural representations: natural ontologies and religious ideas, in Hirschfeld & Gelman (eds.), 391–411.

Boyer, P., 1996. What makes anthropomorphism natural: intuitive ontology and cultural representation. *Journal of the Anthropological Institute* 2, 83–97.

Byrne, R.W. & A. Whiten (eds.), 1988. *Machiavellian Intelligence: Social Expertise and the Evolution of Intellect in Monkeys, Apes and Humans*. Oxford: Clarendon Press.

Byrne, R.W. & A. Whiten, 1992. Cognitive evolution in primates: evidence from tactical deception. *Man* 27, 609–27.

Carey, S. & E. Spelke, 1994. Domain-specific knowledge and conceptual change, in Hirschfeld & Gelman (eds.), 169–200.

Chauvet, J-M., E.B. Deschamps & C. Hillaire, 1995. *La Grotte Chauvet*. Paris: Éditions du Seuil.

Chauvet, J-M., E.B. Deschamps & C. Hillaire, 1996. *Grotte Chauvet: the Discovery of the World's Oldest Paintings.* London: Thames & Hudson.

Clottes. J., 1996. Thematic changes in Upper Palaeolithic art: a view from the Grotte Chauvet. *Antiquity* 70, 276–88.

d'Errico, F., 1995. A new model and its implications for the origin of writing: the La Marche antler revisited. *Cambridge Archaeological Journal* 5(2), 163–206.

d'Errico, F. & C. Cacho, 1994. Notation versus decoration in the Upper Palaeolithic: a case study from Tossal de la Roca, Alicante, Spain. *Journal of Archaeological Science* 21, 185–200.

Delluc, B. & G. Delluc, 1978. Les manifestations graphiques aurignaciennes sur support rocheux des environs des Eyzies (Dordogne). *Gallia Préhistoire* 21, 213–438.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Durkheim, E., 1915. *The Elementary Forms of Religious Life*. London: Allen & Unwin.

Faulstich, P., 1992. Of earth and dreaming: abstraction and naturalism in Warlpiri art, in *Rock Art and Ethnography*, eds. M.J. Morwood & D.R. Hobbs. (Occasional AURA Publication 5.) Melbourne: AURA, 19–23.

Fuller, C.J., 1992. *The Camphor Flame: Popular Hinduism and Society in India*. Princeton (NJ): Princeton University Press.

Gamble, C., 1989. Comment on 'Grave shortcomings: the evidence for Neanderthal burial', by R. Gargett. *Current Anthropology* 30, 181–2.

Gameson, R., 1995. *The Role of Art in the Late Anglo-Saxon Church*. Oxford: Clarendon Press.

Gargett, R., 1989. Grave shortcomings: the evidence for Neanderthal burial. *Current Anthropology* 30, 157–90.

Gimbutas, M., 1974. *The Goddesses and Gods of Old Europe*. London: Thames & Hudson.

Guthrie, S., 1993. *Faces in the Clouds: a New Theory of Religion*. Oxford: Oxford University Press.

Harris, P., 1994. Thinking by children and scientists: false analogies and neglected similarities, in Hirschfeld & Gelman (eds.), 294–315.

Hirschfeld, L.A. & S.A. Gelman (eds.), 1994. *Mapping the Mind: Domain Specificity in Cognition and Culture*. Cambridge: Cambridge University Press.

Hovers, E., Y. Rak, R. Lavi & W.H. Kimbel, 1995. Hominid remains from Amud cave in the context of the Levantine Middle Palaeoliothic. *Paléorient* 21, 47–61.

Humphrey, N., 1976. The social function of intellect, in *Growing Points in Ethology*, eds. P.P.G. Bateson & R.A. Hinde. Cambridge: Cambridge University Press, 303–17.

Karmiloff-Smith, A., 1992. *Beyond Modularity: a Development Perspective on Cognitive Science.* Cambridge (MA): MIT Press.

Knight, C., C. Powers & I. Watts, 1995. The human symbolic revolution: a Darwinian account. *Cambridge Archaeological Journal* 5(1), 75–114.

Leach, E., 1976. *Culture and Communication*. Cambridge: Cambridge University Press.

Leslie, A., 1994. ToMM, ToBY, and agency: core architecture and domain specificity, in Hirschfeld & Gellman (eds.), 119–48.

Lieberman, D.E. & J.J. Shea, 1994. Behavioural differences between Archaic and Modern Humans in the Levantine Mousterian. *American Anthropologist* 96, 330–32.

Lindly, J. & G. Clark, 1990. Symbolism and modern human origins. *Current Anthropology* 31, 233–61.

McCown, T., 1937. Mugharet es-Skhul: description and excavation, in *The Stone Age of Mount Carmel*, eds. D. Garrod & D. Bate. Oxford: Clarendon Press, 91–107.

Marshack, A., 1990. Early hominid symbol and the evolution of human capacity, in *The Emergence of Modern Humans*, ed. P. Mellars. Edinburgh: Edinburgh University Press, 457–98.

Mithen, S., 1988. Looking and learning: Upper Palaeolithic art and information gathering. *World Archaeology* 19, 297–327.

Mithen, S., 1989. To hunt or to paint? Animals and art in the Upper Palaeolithic. *Man* 23, 671–95.

Mithen, S., 1990. *Thoughtful Foragers: a Study of Prehistoric Decision Making*. Cambridge: Cambridge University Press.

Mithen, S., 1994. From domain-specific to generalised intelligence: a cognitive interpretation of the Middle/Upper Palaeolithic transition, in *The Ancient Mind*, eds. C. Renfrew & E. Zubrow. Cambridge: Cambridge University Press, 29–39.

Mithen, S., 1996a. *The Prehistory of the Mind: a Search for the Origins of Art, Science & Religion*. London: Thames & Hudson.

Mithen, S., 1996b. Early Palaeolithic 'concept mediated marks', mental modularity and the origins of art. *Current Anthropology* 37, 666–70.

Mithen, S., 1996c. Domain-specific intelligence and the Neanderthal mind, in *Modelling the Early Human Mind*, eds. P. Mellars & K. Gibson. (McDonald Institute Monograph.) Cambridge: McDonald Institute for Archaeological Research, 217–29.

Mithen, S., 1996d. Putting anthropomorphism into evolutionary context (a comment on Boyer 1996). *Journal of the Royal Anthropological Institute* 2, 717–19.

Morphy, H., 1989. On representing Ancestral Beings, in *Animals into Art*, ed. H. Morphy. London: Unwin Hyman, 144–60.

O'Kelley, M.J., 1982. *Newgrange: Archaeology, Art and Legend*. London: Thames & Hudson.

Park, C.C., 1994. *Sacred Worlds: an Introduction to Geography and Religion*. London: Routledge.

Rak, Y., W.H. Kimbel & E. Hovers, 1994. A Neanderthal infant from Amud Cave, Israel. *Journal of Human Evolution* 26, 313–24.

Renfrew, C., 1985. *The Archaeology of Cult; the Sanctury at Phylakopi*. London: The British School of Archaeology at Athens.

Spelke, E.S., 1991. Physical knowledge in infancy: reflections on Piaget's theory, in *Epigenesis of Mind: Studies in Biology and Culture*, eds. S. Carey & R. Gelman. Hillsdale (NJ): Erlbaum.

Srejović, D., 1972. *Lepenski Vir*. London: Thames & Hudson.

Vandermeersch, B., 1970. Une sépulture moustérienne avec offrandes découverte dans la grotte de Qafzeh. *Comptes Rendus Hebdomadaires des Séances de l'Académie des Sciences* 270, 298–301.

White, T.D. & N. Toth, 1991. The question of ritual cannibalism at Grotta Guattari. *Current Anthropology* 32, 118–38.

Whiten, A. (ed.), 1991. *Natural Theories of Mind: Evolution, Development and Simulation of Everyday Mindreading*. Oxford: Basil Blackwell.

Chapter 10

Chinese Burial Patterns: Sources of Information on Thought and Belief

Jessica Rawson

Ancient Chinese artefacts defined social and personal relationships. In this way, complex technologies, such as bronze casting and jade working were harnessed to the social structure, and hence, inevitably, to patterns of political and religious ideology. The chapter argues that these ideologies were, in part, formed by the objects themselves. Relationships with the ancestors were, for example, modelled by the ways in which sets of bronze ritual vessels for offerings of food and wine supported and sustained a view that relationships with the dead were constituted like those in the family of the living. When in later centuries the ancient Chinese developed fears about the spirit world, there were contained by creating defences, such as pictures on coffins of spirit warriors holding weapons, the famous terracotta warriors and jade suits. All these artefacts were integral to the ways in which concerns with spirits were formulated and resolved.

In several ways, the physical and the material not only reveal but also contribute to what we can call 'thought'. This thesis may be illustrated by the appearances and functions of certain ancient Chinese objects that show several different ways in which their owners provided themselves with the essentials for life and death. From the early Neolithic period, *c*. 6000 BC, the inhabitants of the landmass we today call China buried large numbers of jars, basins and goblets for food and wine, weapons, tools, and even guards and servants: all, it seems, for the benefit of the dead. The shapes of the tombs and the nature of their contents changed over time, and from these changing patterns in the physical remains, we can today deduce the ways in which the makers of the objects and the builders of the tombs assessed the most essential features of life and the afterlife. These assessments presented in a material form imply an intellectual structure: a structure in which the material was indeed an essential part.

Such an approach is intended to support and extend the concept of external symbolic storage considered in this volume. The term 'external symbolic storage' was formed with reference to language and writing; it now includes in addition man-made artefacts. This paper will give specific examples of the ways in which artefacts reveal the assumptions and intentions of their makers and users. The words 'symbolic storage' suggest, however, that assumptions (namely ideas and beliefs), and intentions, exist prior to the artefacts and are simply stored in them. But the artefacts do not simply store; they are integral to the process of forming the beliefs and of bringing them into being. Recent work on cognitive processes described by Andy Clark supports this approach (Clark 1997).[1]

Much of the discussion in this volume has been shaped by Merlin Donald's distinction between three modes of activity and thought which he terms 'mimetic', 'mythic' and 'theoretic', and the ways in which such categories of activity can be discerned by us today in the artefacts left behind by ancient peoples. In place of these specific terms, which might be regarded as over-conditioned by Western philosophical notions (Hall & Ames 1995), we may term the three categories of activity as 'performative', 'narrative' and 'theoretic'.

Into the first category will fall the rituals in

Figure 10.1. *Archaeological sites in China.*

which the ancient Chinese offered ceremonial banquets to their ancestors. Fine bronze vessels (Fig. 10.2) made for these ceremonies allow us to consider the contribution of artefacts combined with coordinated actions to the expression of social and ritual relationships and to the intellectual structures that supported these notions. Here the view that thoughts and emotions are embodied is relevant (Damasio 1994; Clark 1997). Complete tombs equipped with objects for ritual, warfare and daily life display artefacts that present a specific individual and his or her narrative in an idealized form. To such discussion of both performance and narrative, the work of Goffman makes a significant contribution. Goffman has employed the analogy of a theatre with actors, each with a role, to describe the ways in which individuals integrate their self-image in their interactions with each other (Goffman 1969).

Finally, changes both in ritual objects and in tomb contents allow us to discern in these changes ways in which theories about life, the afterlife and the structure of the universe were associated with human interaction with single objects — an individual bronze, with sets of such objects — a ritual assemblage, and with a group of sets — the necessities for a tomb, all of which, severally or in groups, contributed the apparatus upon which human minds could work both to think and to act. The theories so developed are the paradigms selected by Michael Carrithers (1992) as one part of the apparatus of a belief system. Carrithers, in describing Buddhism, in particular, has suggested that narratives, that is, stories about events and lives, combine with paradigms, that is theoretical statements about a faith, to provide two complementary views within a belief system. Narratives and paradigms are nonetheless interdependent, as a particular narrative implies a specific theoretical framework. So too the narratives exemplified by a burial of a particular individual and the theoretical perspective of the society of that time are interlinked. Indeed the objects in such ancient Chinese tombs served both projects. In this relation between narrative and theory, we see also a relation between intention and interpretation. For the objects to be described will reveal some of their authors' intentions and will also illustrate the range of interpretations that peoples of the period derived from them.

One of the truisms of human society, and one that will be extensively illustrated here, is that it is to a very large extent constructed by the members of the society, who continue to exist in a dialectal relationship with it, modifying and changing some or all of its possessions, practices and beliefs, generation to generation (Renfrew this volume; Hinde this volume). The sense of ease or success enjoyed by members of any society is likely to be correlated with the sense of control and coherence that these interactions give members of the society in question (Hinde 1997, ch. 29). Members of a society achieve such coherence by sharing in and developing practices and beliefs, gaining for themselves a sense of belonging to an established, secure and comprehensible tradition. Sustained growth of a tradition depends upon some fundamental shared principles that are susceptible to variety, change and development to ensure coherence in a changing world. As I shall suggest below, such sharing is often focused by shared categories of object and shared physical representations.

Another persistent aspect of human activity is the urge to interpret the environment. Natural and man-made objects are subjects of and aids to that interpretation. Very often, such interpretation goes far beyond the human and the here and now.

Figure 10.2. *Bronze ritual wine flask. Shang dynasty, c. 1200* BC. *Height 29.8 cm. British Museum.*

Peoples of all regions of the world and of all periods show a persistent tendency to identify sources of, or attribute causes to, phenomena, and to consider among those causes demons, spirits and gods. As Stewart Guthrie has shown, animism and anthropomorphism — attributing natural events as well as disasters to human-like forces — which in China included the ancestors and other spirits, as well as deities and demons, arise from a human propensity to seek the best possible, in the sense of the most useful, interpretation of the phenomena they observe, be those phenomena natural — such as thunderstorms; or medical — such as body sores, or sudden death (Guthrie 1993).

What we will also observe are ways of interpreting the unknown in terms of the known, using extensive analogies. Thus the life after death was viewed as analogous to this one. Metaphor, in the sense of the use of a root metaphor, as described by Lakoff & Johnson (1980), plays its part in such development and explanation (Rawson 1993b). In addition, symbolic systems were characteristic of ancient China, as they are still of all sorts human activity — symbolism here being employed to suggest that one thing or sign is taken to stand for something or for a collection of quite different things. But instead of thinking of symbols that have the arbitrary character of writing systems, we shall be looking at symbolism in a wide range of other guises — where richness of utensils presents rank, where physical qualities of materials, such as jade, indicate spiritual worth, and where representations made of earthly materials picture the life of the spirits.

Writing is often treated as the paradigm of such symbolism. In our present world, dominated by writing, knowledge is an accumulation of information and theory through the written word. However, creation of writing followed a long way behind human understanding of the natural world and behind spoken languages and cultures based upon a meshing of material objects with social interactions. Literacy is not a skill essential to successful cultural life, as the millennia of early cultures and many present-day ones demonstrate. Indeed, in the past and still in the present-day, all children assume large portions of the cultures into which they are born long before the written word is accessible to them. We must infer that many, if not most, aspects of a culture are managed by a society and can be handed on in ways that do not involve writing. In its place, other physical signs, especially artefacts, buildings and representations — permanent and transitory — may focus attention and serve as sources of instruction, as guides or as restraints. Even today, we interpret both the natural world and our own culturally constructed one through what we see and experience in landscapes, cities or houses. These physical elements provide a whole apparatus for living, but one that we have to interpret if we are to live successfully. Such interpretations are developed in each of us, principally through socialization and through education. Symbolic storage, especially in forms of writing, measurement and other deliberately created sign systems, are only the tip of a much larger range of material that mankind interprets and indeed creates so that it can be interpreted. The paper will concentrate on the ways in which material objects and complex depictions composed of artefacts, susceptible to interpretation, were deployed to reinforce and develop such interpretations.

We shall find in the material culture of China props and scenery for the roles described by Goffman and the performances and narratives expected by Donald's modes. These modes can, it will emerge, be read from artefacts; for all humans intentionally design their own settings and the artefacts that they use, first of all so that they are intelligible to themselves and secondly so that any bystanders or audience, including a spirit audience, can similarly interpret them. Rather than treating single artefacts, groups will be taken as the main subject, since the groups provide the props and settings employed in performance, whereas a single artefact is but a fragment in most cases. As already mentioned, instead of describing such groups as 'texts' in the postmodernist vein (even though the notion of text is generally understood metaphorically), such artefact groups will be recognized as separate and distinct from texts. Indeed, here we might note that our reading of texts may even be determined by processes of interpretation honed in deciphering objects and representations.[2] Visual clues therefore will help us understand how artefacts enabled social and religious meaning to be presented through Chinese burials for interpretation by audiences of humans and spirits.

An essential aspect of the discussion is the role of physical features, most particularly visible differences, in allowing the visual to be harnessed to the social, political and religious interactions in a culture. Several authors have stressed the role of visible, rather than verbal, intelligibility for complex practical tasks. Ranging from work on the processes of driving, flying or riding a bicycle (Miller *et al.* 1960, 87) to yet more culturally specific tasks, such as weaving (Bloch 1991, 186) and recognition of objects (Miller 1987), the ways in which the material

world provides detailed visual information and cues, rather than verbal instruction, have been stressed. Indeed, as both Miller and Bloch have indicated, our visual discrimination far exceeds our ability to express these distinctions in words.

Visual differences in the props for performance and in the stage settings for narratives will be explored, although sound and smell were no doubt also contributors. While many commentators have recognized the widespread use of artefacts and images as indicators of social or religious status, most have commented on the exploitative side of such visually reinforced social structures. Few seem to have described the ways in which artefacts — clothes, buildings or images — are indispensable, not only to public or private announcement of social or ritual position, but also to create these positions (Renfrew 1986). Nor have many students of artefacts accepted that societies will inevitably have some sort of structure and that that structure will also inevitably be both marked and reinforced by material and hence by visual means.

There may, indeed, be good perceptual reasons why systems of status or rank, be they steeply graded or relatively egalitarian, are reinforced, or even created, visually. For the visual provides a readily discernable and reliably recognizable focus of attention; our perceptual system is indeed particularly well attuned to minute visual differences. Complex ideas can then be linked to such differences, which become codes or cues, enabling members of a given society to remember and to react to a social, political or religious situation that might otherwise be virtually unintelligible (Carruthers 1990, 20).

Not only will the visual be the topic of this paper, but at the end, when we reach a period in which written texts expounding belief and practice are contemporary with burials (whose contents we can compare with them), we shall note that the interpretations suggested by canonical philosophical texts are not co-extensive with or even remotely equivalent to the interpretations that can be derived from the artefacts, which tell us, as they told their owners, about their views on the spiritual world and on the afterlife. Throughout the discussion we shall see literal use of objects to indicate function and symbolic use to suggest rank; we shall also find extensive use of reference, analogy and metaphor suggested by function, material, form and decoration of artefacts, which enabled a complex world of ideas to be created and reinforced by artefacts rather than exclusively by languages, spoken and written. At all stages, however, the process was dialectical, with a dialogue between the artefacts and the peoples who sought to exploit them in intellectual as well as physical settings (Hinde this volume).

Western and Chinese views of the afterlife: metaphor and analogy

If we are to make sense of the very large body of data, essentially visual data, available on ancient Chinese burial practices, we have to start with some sort of general proposition, a heuristic device — perhaps we should call it a working hypothesis — of what the underlying assumption, analogy or metaphor was — the structuring principle from which all others were developed. The one that I adopt here is that material remains suggest that Chinese tombs were constructed to provide all the necessities that their occupants might need to continue their existences after death — existences that would replicate or extend worldly life. This simple hypothesis allows me to introduce what I see as the overall structuring concept, that is a transfer, by means of analogy, of a set of practices, material and cognitive, from one situation to another. It is possible to describe the Chinese ideas of the life after death as being analogous to their views of real life. The tomb was simultaneously a presentation of this life and of the next. In this way, the unknown was interpreted and explained by means of the known. Such a procedure was not infinitely extendable, but held by certain constraints. These constraints included, most probably, the taught assumptions of the society, some of which may have functioned somewhat like root metaphors discussed by Lakoff & Johnson (1980). Other constraints were the objects themselves, and the craft traditions and social practices that determined and were determined by their forms and uses.

I will now justify this process by my own analogy, involving a comparison between Chinese and Western views of the afterlife. The Christian ideas of the Kingdom of Heaven reveal both the literal and the metaphorical qualities of this practice. In both text and illustration, the peoples of the European West described life as journey that ended when the Kingdom of Heaven was reached, a place pictured, again in words and visual representation, including artefacts, as a court similar to those of the great European monarchs. God was described and shown as sitting upon a throne. The unknown was thus pictured and interpreted in terms of the known. Much use was made of fine materials, gold and jewels, in representations, so reinforcing by further visual analogy or metaphor the interpretations to be given to

the Heavenly Court. Gold, for example, embraced its own range of meanings — standing for purity and incorruptibility. These subsidiary metaphorical meanings (derived from its physical attributes), probably contributed at all times to the imagery of Heaven. In addition, stories, such as the narratives in the Bible, describing the ascent of Christ into Heaven, or the description of St Peter at a Gate, whose keys he held, and tales of ordinary mortals, as in the *Pilgrim's Progress*, were all elaborations based on both the literal, representational and metaphorical elements of this cognitive pattern (Goodman 1976, 45–95). Such metaphors not only engender intellectual comprehension of the unknown, but also exploit our bodily and emotional reactions to the images of power expressed in regal terms and of eternal joy shown in the form of brilliant colours against a bright ground.

Metaphors or analogies of journeys and of courts were thus essential means of creating before the eye the unknown and the invisible, enabling artists, patrons and interpreters — or viewers — of all periods to add to or subtract from these wider representational and metaphorical meanings other elements, as their own experience allowed. For it seems that the more satisfying systems of forming and elaborating meaning are those that, while held within clear parameters, allow individuals to make their own versions of the standard repertoire. Indeed, the cognitive and material norms of a society are always in a dialectical relationship with individual members of that society, who appropriate them, modify them and make them their own. Yet it also remains useful to the individual, both as an individual and as a member of a group, to adhere to a principal meaning or metaphor, so making certain of consistency — both internally within a single point of view and externally with those of other individuals. Such consistency by means of shared cognitive patterns defines a culture (Romney *et al.* 1996).

If we turn now to China, we can see the same transfer of features of the known to the unknown, of the exploitation of incident, of the use of narrative, and of literal imagery and analogy to construct and reinforce and indeed, over time, to extend ancient Chinese views of the afterlife (Rawson 1993b). For instance, the Chinese do not seem to have started with either the notion of a journey or the notion of a distant goal, the Kingdom of Heaven. They wanted to stay just where they already were. From the Neolithic until nearly the modern day, the majority of Chinese tombs were equipped as residences for the dead, containing either real objects or replicas. As these tombs reproduced the lives of their occupants, they tell us not just how their owners thought about death and the afterlife, but also how they envisaged many aspects of the society of the living. A consequence of this outlook was that the dead remained ever present members of society, near at hand.

In the Shang period (*c.* 1200–1050 BC), in particular, divination texts reveal that the ancestors were important family members, consulted on all serious family matters, and that they were offered food and wine, that is nourishment, in the form of ceremonial banquets. We have no texts about the burial of the dead, nor about their aspirations for a life after death. From the burial of the bronze offering vessels in the tombs of the élite, however, it would appear that the dead were expected to continue, as in life, to offer banquets to their forebears. They were also to pursue other aristocratic and royal activities, including warfare (with weapons and chariots), hunting and ceremony — the latter indicated by fine ornaments and ceremonial weapons of a non-functional material, jade. In part the tombs were idealized, literal presentations; at the same time they exploited metaphor in simple ways, in which jade (like gold in the West) provided allusion to purity and permanence; and in more complex ways, by which notions about the society of the living and of the dead were developed by analogy with the structure of the ideal family.

These notions were not shared by all contemporary peoples inhabiting the landmass of China, as we shall see. Differences indicated by artefacts in several geographically separated societies, indeed, reveal specific ways by which these groups constructed and perpetuated particular practices (and, presumably, the assumptions, intentions and interpretations that were supported by them) through their own distinctive material cultures. We shall see that the inhabitants of the Yellow River area shared an abiding interest in highly decorated objects with which to perform ceremonies, while the inhabitants of the many communities along the Yangzi River had diverse material cultures, in which representations of animals and strange imaginary beings played a large part. The artefacts of these peoples were not only quite distinct from one another, but were also quite different from those of the principal Yellow River cultures (Bagley 1992). If the material cultures were so different, it is likely that both practice and belief were different also. Further, the discussion will show that, as the size of the Chinese-speaking polity grew, some peoples with very different outlooks and

practices were drawn into close contact with traditional Chinese society, which brought about amalgamations in artefact types, in practices, in intention and in interpretations or beliefs.

Ritual vessel sets

The overwhelming importance of offerings to the ancestors in Early Bronze Age society along the Yellow River is demonstrated by the wealth of metal and of craftsmanship tied up in the ritual vessels, used in life and expected, it would seem, to be further employed in the afterlife, as the dead continued in the other world to offer banquets to their ancestors. That is to say, the quantity and quality of bronze and craftsmanship in themselves are important traces of a view of the ancestors and of how they should be approached (Fig. 10.2). As the ritual vessels are so significant, they will be considered first, before their relative place in tombs is further discussed. In addition, an account of this artefact type allows us to consider two other principal categories of activity: the use of visual differences to provide social and ritual references and the role of performance to formulate and convey ideas.

Possibly the single most significant idea embodied in the ritual set of bronzes was that the ancestors remained an essential part of society. Society was ordered hierarchically by generation, a hierarchy reinforced symbolically each time the rituals were performed. In this view, society had a genealogical source and structure (Hall & Ames 1995). This was a far cry from the Western Christian view that all are equal before God. If we are to seek for a single process that established this concept of the society, living and dead, it would seem that the ritual ceremonies were in themselves creators of these views as well as products of them.

A further reason for concentrating on a single artefact category is that through it we can get some impression of the ways in which all artefacts offer information on the reactions, the thinking and the attitudes of peoples of their day. Ritual vessel sets are especially instructive because they are composite rather

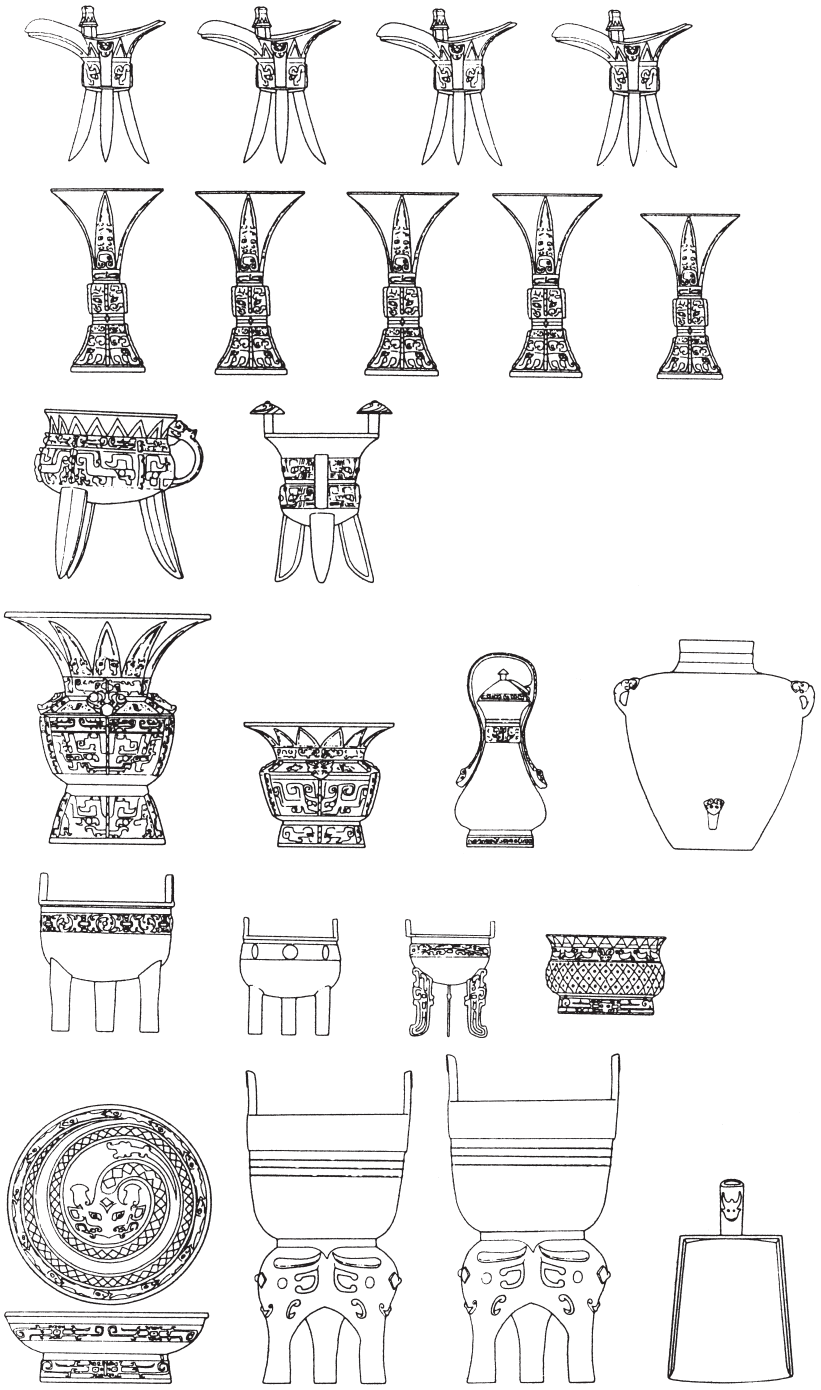


Figure 10.3. *Drawing of a typical set of Shang dynasty ritual vessels from tomb 18 at Anyang, Henan province. Such a set would have belonged to a noble of high standing, but was much smaller than the set belonging to the royal consort Fu Hao. (After Kaogu xuebao 1981.4, 491–518.)*

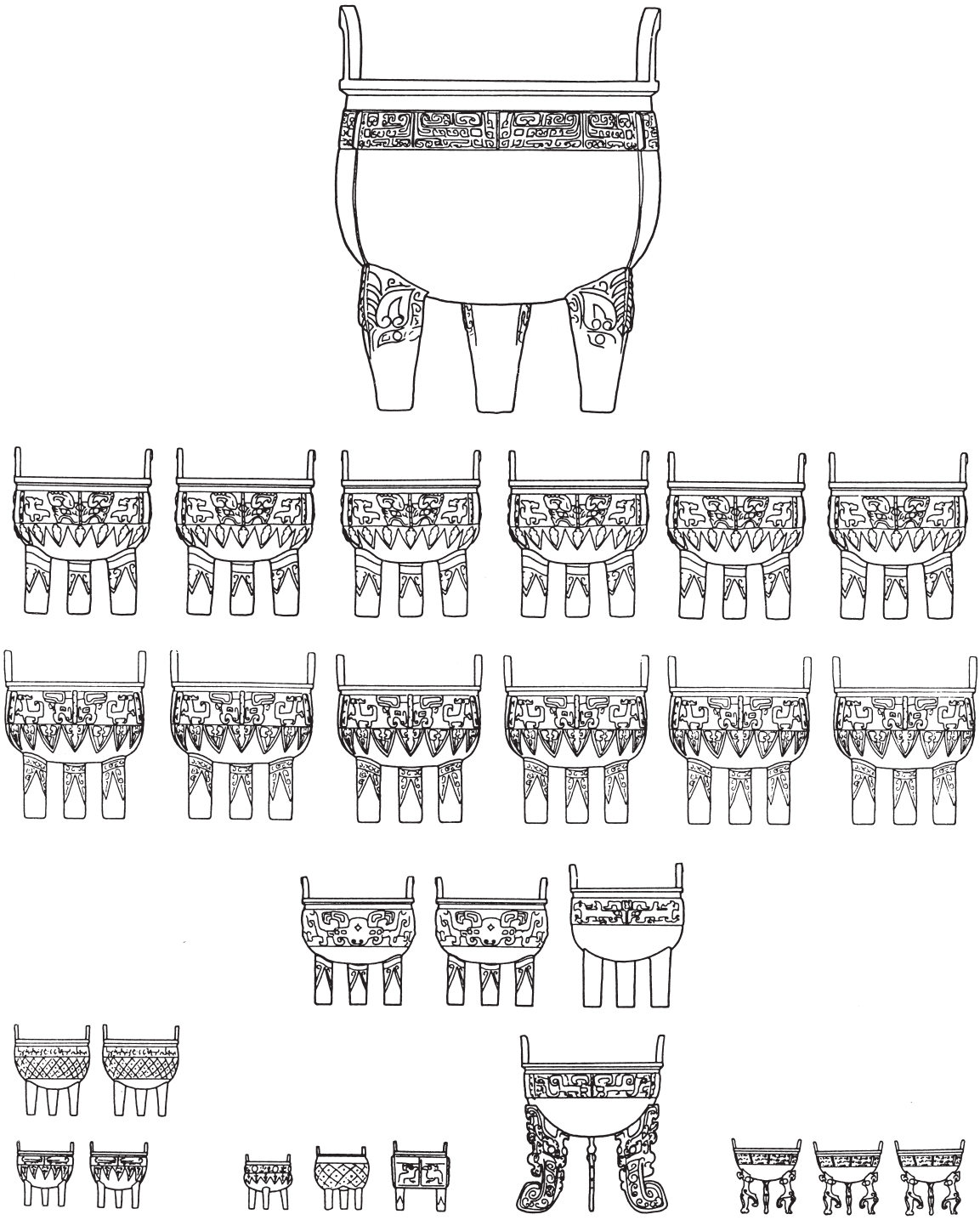


Figure 10.4. *Drawings of the food tripods, ding, from the tomb of the royal consort Fu Hao, Shang dynasty, c. 1200* BC. *From Anyang in Henan province. The different sizes, shapes and decoration indicate that these bronzes had different functions within diverse rituals. (After Beijing 1980a.)*

than singular objects and are highly complex, both technically and artistically.[3] This complexity was integral to the ritual performance and could be marshalled to serve both a social and a religious programme.

Many thousands of Shang and Western Zhou

ritual bronze vessels survive, and a large proportion of them come from excavated tombs. These are often close together and belong to members of one family or to a related class of individuals. Tomb contents may, therefore, be reliably compared. At any one period, individual vessel types and groups of such types appear to have been standard, that is, universally employed and hence recognized, in what were the metropolitan areas — the cities of Zhengzhou, Panlongcheng and Anyang in the Shang period (*c*. 1500–1050 BC) and much of Shaanxi province, and the city states of Jin, Wei and Yan in the Zhou period (*c*. 1050–771 BC) (Rawson 1996). The majority of vessel groups known survive from tombs of nobles, but where a burial of a higher-ranking individual has come to light, a yet larger grouping is available. Thus we can say that vessels were made and employed according to known rules, even though many of these may have been implicit rather than explicit.

Let us consider four vessel sets or part sets. One, from tomb 18 at Anyang, belonging to a high-ranking member of the Shang period élite, *c*. 1200 BC (Beijing 1981) (Fig. 10.3), will be measured against vessels of a single category, the *ding*, from a higher ranking tomb, that of the royal consort Fu Hao (Beijing 1980a) (Fig. 10.4). A set from tomb M7 at the site of Rujiazhuang near the present-day city of Baoji, the tomb of a Zhou noble of *c*. 950 BC (Lu Liancheng & Hu Zhisheng 1988) (Fig. 10.5a) will be compared with a set belonging to a noble of a slightly later date, one Wei Bo Xing of *c*. 875 BC, found in a hoard in Fufeng county, west of the present-day city of Xi'an (Fig. 10.6) (Rawson 1993a).

The set from tomb 18 at Anyang (Fig. 10.3) contains a full complement of vessel types. More-over, it illustrates the relative importance of offerings of wine and the lesser role of food. From the large number of vessels in the tomb of Fu Hao only food tripods are illustrated here (Fig. 10.4). These many tripods probably comprised vessels with several different functions; the small ones at the bottom of the figure may have been for travelling or for subordinate ceremonies. This very large number of tripods shows how the expenditure of effort and resources for a royal set outweighed the bronze craftsmanship and food used for the set belonging to a noble (Fig. 10.3).

The vessel set from tomb 7 at Baoji Rujiazhuang (Fig. 10.5a) dates from the time of the succeeding dynasty, the Zhou. The vessel types are similar, but not identical to those of the Shang, as represented by Figure 10.3. Zhou ritual clearly emphasized food. However, like the set from tomb 18 at Anyang, this later one contains vessels of several categories, many with fine zoomorphic ornament. The final set, belonging to the noble, Wei Bo Xing (Fig. 10.6), is quite different. Repetition rather than variety is immediately apparent. Moreover, the shapes and their ornament seem less lively than those of the earlier bronzes. Both ritual practice and vessel casting seem to have been changed.

Piece by piece, the range of vessel shapes and the decoration of a set of bronzes can be seen to vary minutely and, over time, to show sharp changes. The variations are, and probably were in the past, perceived both as aesthetic changes and as indicators of when they were made, who owned them and, if the functions of the sets changed (as illustrated by Fig. 10.6), of new fashions in ritual. The particular interest of the ritual vessels is that they were made and used in large sets, and that these sets conveyed visual information more complex that a single item could do.

In defining the nature of a set of any type and its functions, it is useful to consider the analogy of a tool set, such as a set of blades for turning employed in nineteenth- and early twentieth-century Western workshops (Fig. 10.7). The set is to some extent arbitrary. It can be defined either as the complete set made by an individual or group at one time, or as the particular range of blades owned by a craftsman at any specific time. Breakage or purchase might randomly subtract from or add to the set and enable the owner to make fewer or more categories of turned object. A set is thus a functional group, determined in part by ownership and by all the variables which that implies. Each blade has a specific and defined cross-section, one that was known to a specialist with the appropriate skill or competence. Small increments of change in the detail of the cutting edges would have been immediately visible and intelligible to expert craftsmen through these visual properties. The vessel set, similarly, very likely conveyed comparable information in its day to the skilled practitioner, perhaps a priest, but possibly also the patron and members of his or her family. Changes in numbers or types of vessel in a set, or in form and design, would likewise have been visible and intelligible through this visibility. In the case of the tools, changes in shape would have made possible different types of product; and new vessel types would equally have allowed new variations within the scheme of offering specific foods and wines.

This example introduces a feature of all objects, but one that is especially true of complex objects consisting of a 'set' of parts, namely that people

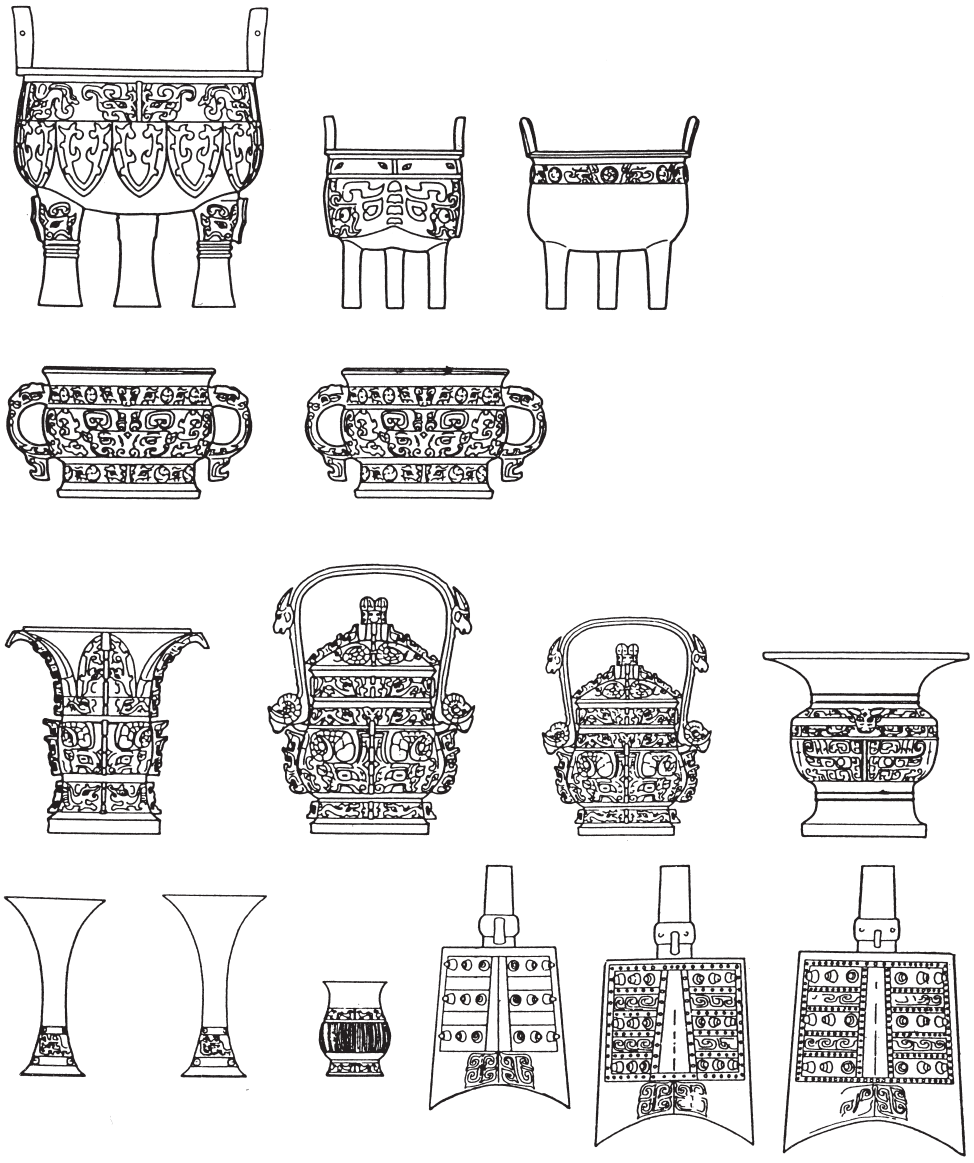


Figure 10.5a. *Drawings of the sets of bronze ritual vessels and bells from tomb 7 at Baoji Zhuyuangou in Shaanxi province. Early Western Zhou, c. 950* BC. *(After Lu Liancheng & Hu Zhisheng 1988.)*

assess the uses of particular items through comparisons of visible features of shape and decoration (Miller 1987). A single object is compared with objects previously encountered. A set, on the other hand, presents within itself similarities or differences between the individual parts. We can surmise also that the people of the day compared their own sets with those they could expect others might own.

The many similarities and differences between the items in an individual set would have been apparent when the set of vessels was not in use, but stored. They may have been even more telling when the set was employed in a ritual. Although we are not ritual experts of the Shang, we can nonetheless attempt an account of the features that would have helped an expert of the time to discriminate between vessels with different roles in the ritual sequence and with different social or religious connotations. Thus in the set from tomb 18 at Anyang, the relative importance of different types of wine holder appears to be indicated by the presence of fine relief decoration on wine vessels, especially on the vessel category known as a *zun* and its absence from the vessel type known as a *lei* (Fig. 10.3). It is likely that the wide bodied *lei* was intended for storing liquids, while the angular and highly decorated, and hence conspicuous, *zun* was for serving them. Such a difference between *zun* and *lei* occurs quite regularly. The nearer the stage in the ritual to consumption, the more elaborate the vessels.

Differences in social status are also marked by the vessels. Thus the individual who owned the twenty or so vessels from tomb 18 was obviously less powerful than the consort of the king of the day, lady Fu Hao, who was buried with more than 200. Her circular tripods for food alone numbered 27, as shown in Figure 10.4. Status seems to have been shown by numbers, size and range of forms and decoration. In other words, both the functional characteristics of the sets and their aesthetic qualities, embodied in bronze and craftsmanship, meshed with the social order (as

Hodder 1986; Miller 1987, 118–21 have argued). In addition, a few vessels, especially those in Fu Hao's tomb, but also those in tomb 7 at Zhuyuangou (Fig. 10.5a) have shapes or decoration that refer either to traditional designs or to exotic motifs from other areas (Pomian 1990), or are even antiquities that were handed down through several generations, or carry inscriptions that indicate that at an earlier date they had belonged to someone else (Rawson 1993a). Here then a range of visual features also specified references to relationships between the owner and a place, or with other individuals and or with the past, although only an expert, a member of the family or a ritual specialist, would have recognized all the references. In this way, we can see the shapes and designs of the bronzes providing what will here be described as a range of references to function, relationships, place, the past and ritual process. Bronze ritual vessels thus contributed to and reinforced the social ordering, both at one time, and over a long span of time.

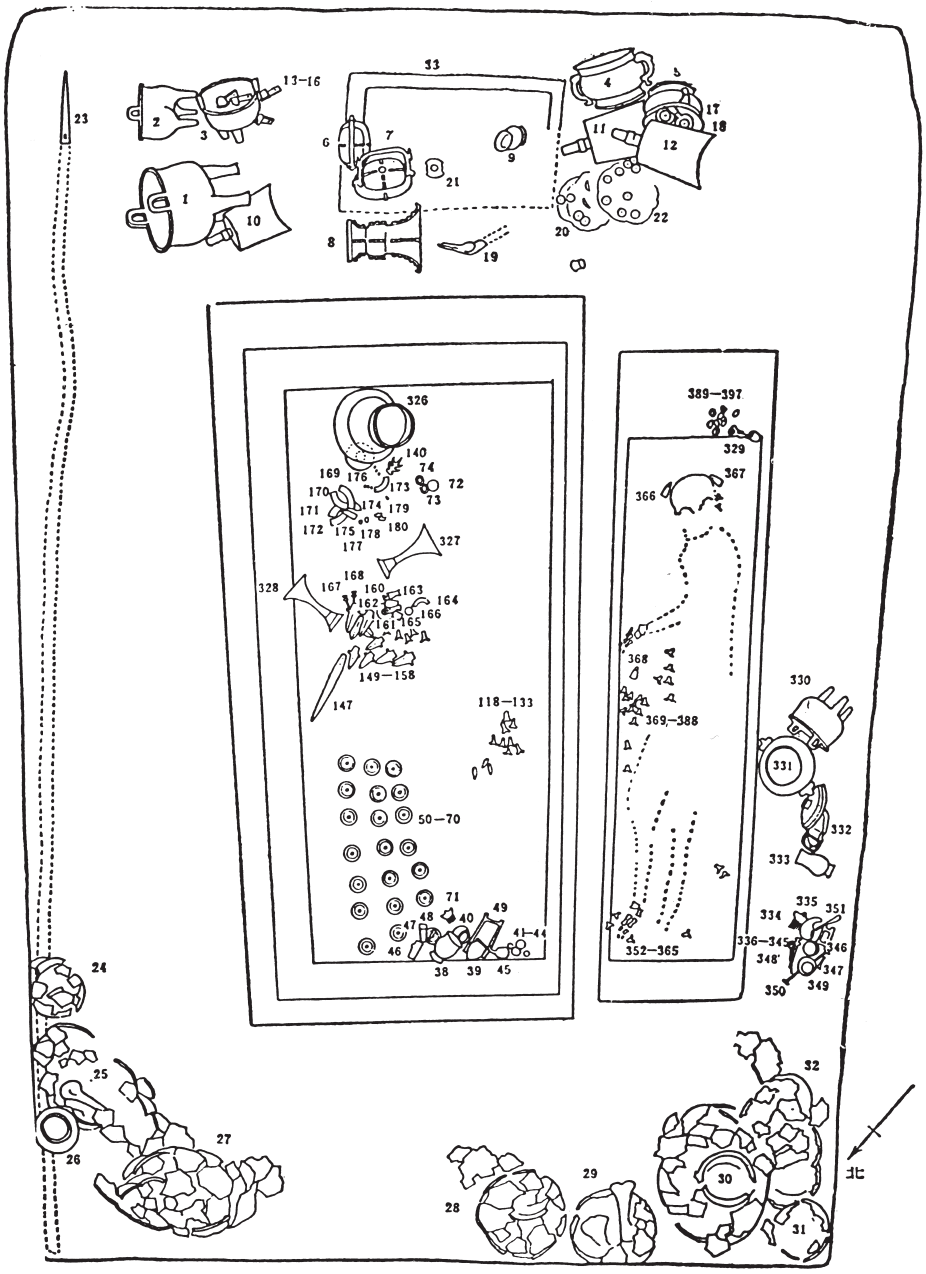


Figure 10.5b. *Drawing of the tomb 7 from Baoji Zhuyuangou showing the main burial with a female interred to one side. The female has a bronze ritual set smaller than that of the male.*

As well as considering the set as a single object with many parts, we can also consider it as providing props for a performance. For the expert, be they ritual practitioner, patron or audience, each vessel category seems likely to have specified, by means of its shape and design, its place in a sequence with other vessels and a range of movements with which it was carried in the ritual ceremony. That is, the visual features of the vessels encoded bodily movements. The suggestion that there were designated participants with known roles in relation to the vessels is made because the range of vessels used at any one period seems to have been standardized, indicating a standard ritual for which sets of objects could be ordered and employed.

In some cases, no doubt, the vessel shape and decoration, as in the case of the *ding* belonging to Fu

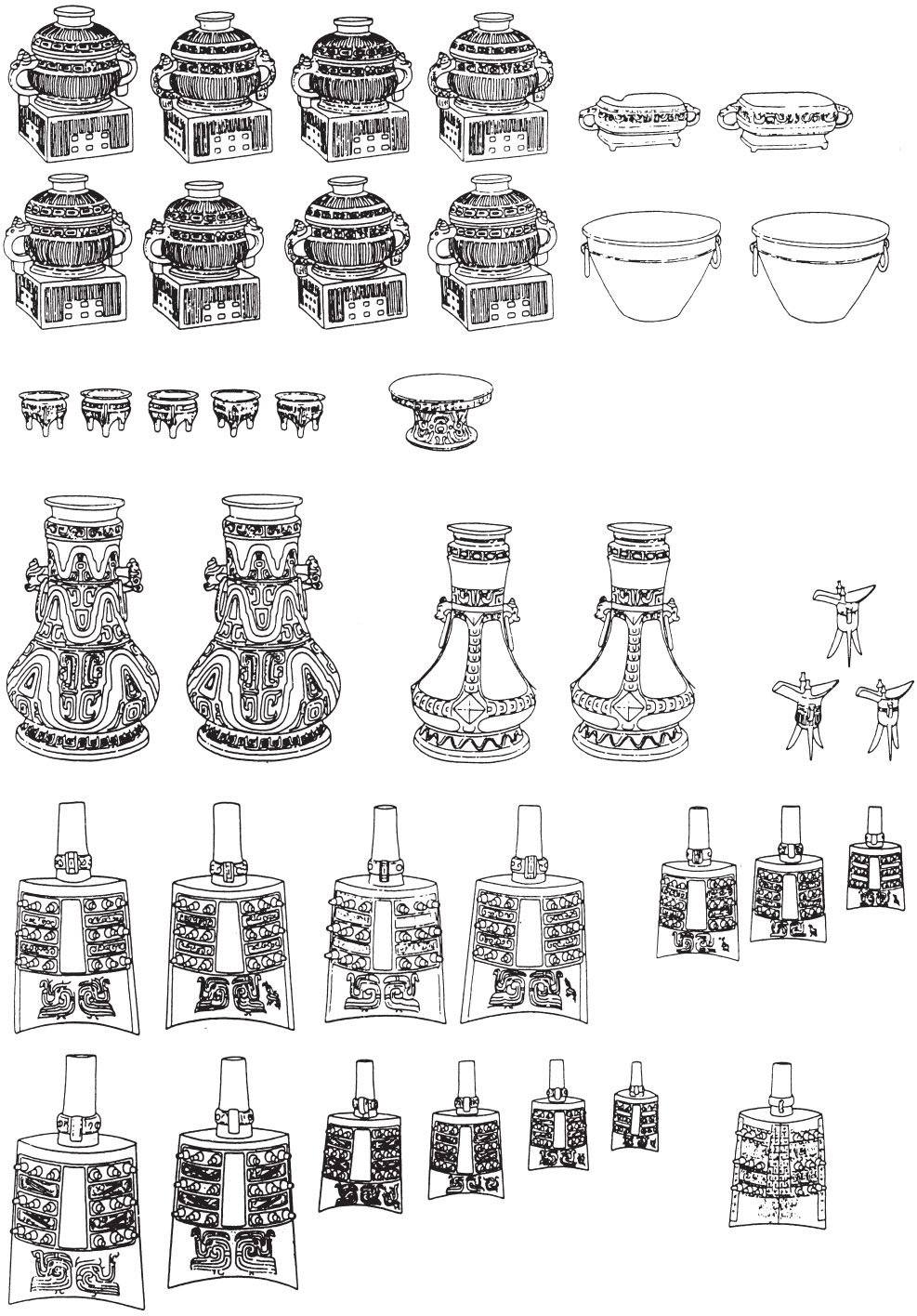


Figure 10.6. *Drawings of ritual vessels and bells cast by one Wei Bo Xing, found in a hoard at Fufeng county in Shaanxi province. Late Western Zhou period, 9th century* BC. *(After Rawson 1993a.)*

Hao, specified for which particular ritual they were used. Here, indeed, we have something equivalent to the category of thought and practice labelled as 'mimetic' by Donald. But, as I have already suggested, this is not a category of thought or practice that preceded other developments, such as 'mythic' or 'narrative' thought. Rather some expression of beliefs and intentions through physically enacted performance involving objects seems likely to have been an essential element of all ritual and social practice from the Neolithic period and so, indeed, survives to this day. We can compare the range of actions encoded by the vessels to the those familiar to us in the West when a sword or crown are employed in ceremonies at which the Queen is present. The vessel types provided some of the cues, no doubt, to the sequence of actions. Moreover, changes in the performance over time are still visible to us today, if we compare the two Western Zhou sets illustrated in Figures 10.5a and 10.6. The gestures and foods required for the later set could not have duplicated those of the earlier one. While the early set comprises many different vessel types, with numerous wine vessels, the later set comprises many identical pieces, few among them for wine. The vessels in the later set (Fig. 10.6) are also cumbersome and heavy, difficult to carry, but easy to display to an audience at some distance. Moreover, the very large expenditure on bronze bells (used only sparingly at earlier times) probably transformed the ritual ceremonies. Additional elements thus added to the

effects on the audience.

More vessels of a particular type, say the twenty-seven *ding* of Fu Hao (Fig. 10.4), as opposed to the three *ding* in tomb 18 (Fig. 10.3), would have required more actions to move and serve with them at a ritual and would also have required more food. While static, the vessels already indicate a social ranking; when in motion in a ritual, they would have proclaimed, in what one might describe as a dramatic form, the social order. In addition, decoration and inscriptions indicated different relationships, such as with earlier generations of owners or with contemporary relatives or associates and with exotic, outlandish contacts. References to these relationships would all have had their places and would have been woven into sequences of gestures and movements. To practitioners of the day, the position of these references at the different stages of the ritual would have been likely, I assume, to have given them different emphases. These emphases and the reactions they produced were no doubt as much bodily and emotional as intellectual (Damasio 1994). Some sections of the performance may have stimulated respect and others awe.

So far I have mentioned the practitioners, by which I mean the ritual specialists and their servants or attendants. All ritual acts also had an audience, be that simply the patron and his or her relatives and servants, or a larger court audience. The spirits, especially the spirits of the ancestors, are likely to have been included in this audience. These comments relate specifically to the living, but complex burials, such as those of tomb 18 or of Fu Hao, which included servants as well as the tomb occupant, seem to have duplicated life — providing ritual specialists and attendants for the ceremonies, among other functions, in the afterlife. It can be presumed that the audience would have recognized through gestures, and rhythmic movement, as well as particular vessel types, the status and relationships of the individual who made the offerings and the persons or ancestors to whom they were made. Later poems of *c*. 600 BC mention aromas of food as attracting the attention of the spirits, and it is likely that the smell of food and drink also played a part in the assessment of the messages of the rituals. The performance probably cemented the relationships of generations in ceremonial meals that incorporated mention through such references of a wide sphere of interactions, relevant not only to this life but also to the afterlife. In these ways, the realm of the ancestors would have been interpreted within a particular view of the present.

Indeed, under the Zhou, who conquered the Shang in about 1050 BC, this modelling was self-consciously reinterpreted in a yet more political mode. For the inscriptions on the ritual vessels incorporated reports of political honours, of relationships between their owners and the king and even such contentious local matters as battles and court cases. From the language of these inscriptions and from their positions inside basins (under the food), it seems that their contents — their announcements of the new honours and status of their owners — were directed at the ancestors as well as at the living society and its descendants. Thus the performance and its messages were extended from a presentation of relationships between a series of generations of a family to a semi-political account, in which the political actions of the world were, it seems, deemed interesting to and hence, perhaps, influential on the ancestors as well as on the living. The universe of spirits was literally modelled on the present, through the ancestral sacrifices forming a shared activity.

Tomb structures: narrative thought in the Shang and early Western Zhou (*c*. 1200–*c*. 800)

A complete tomb brings a wider range of activity into the discussion. While the vessel set was for use in a particular category of performance, a tomb and its adjacent pits holding wives and concubines, high-ranking nobles, and chariots, encompassed multiple activities that were basic elements of courtly and noble ceremonial life. Elaborate tombs presented a life as but one scene in a longer narrative. By the time of the high Shang, about 1200 BC, the two categories of performance and narrative cannot be separated. Instead they interact and thus become integrated. What is more, some of the same basic assumptions about, and interpretations of, the universe must have informed them both and thus created and sustained coherence between these different activities.

The story of the individual began in this life and was (it seems likely) assumed to continue into the afterlife in the same manner. Selection of the sets of items for burial, however, suggests an idealized life, with only the essentials given emphasis. In this sense the tomb presents not real life but only selected aspects of real life, as Barry Kemp has suggested with reference to the idealized plan of ancient Egyptian town plans. They are:

> . . . testimony of one particular facet of the creative element in society: its capacity to structure its own environment and beyond this to create visions of how human society should look. . . If . . . we admit

> that the evidence in a particular case points to a clear and consistent underlying human ideal, we are tacitly admitting to an ideology. Not necessarily a formally conceived and expressed ideology such as that which portrayed Egyptian kingship, but an implicit ideology of social ordering. (Kemp 1989, 137–8)

In a comparable way, the tomb presented the essential and the best features of life: how it should be, not necessarily how it actually was in all respects. Idealized though the life might be, however, it would be misleading to treat the presentation of the individual achieved in the tomb as fictional in any way. Rather, we should view the objects in tombs and the activities that they enabled as the best possible range of material to provide the best possible apparatus for future life. As the stories in the Bible were and are treated as true, and the images of the Saints and of the Virgin were treated as painted from life and hence also true (Belting 1994), so the burials of the Shang, Zhou, Qin and Han periods were all regarded as providing for an afterlife that existed in parallel with the lives of the kings and aristocracy.[4] Indeed, all activity in ancient China, and hence all artefacts and buildings, seem to have been designed with the view that the worlds of ancestors and spirits and of humankind interpenetrated one another. Presumably, both had an effect on one another at all times and both were relevant with respect to each other.

Ancient tombs of the Shang and Western Zhou contained valuable objects, often in very large quantities: bronze ritual vessels, chariots and weapons, precious jade carvings and bone ornaments, musical instruments, and human servants and warriors to defend their owners. Such goods dictated and determined a quite specific afterlife: one modelled entirely on real life. Emphasis on bronze ritual vessels, and on the weapons and vehicles of war, displayed the major activities of the Shang and early Zhou kings and nobles. Like the vessels, the chariots and weapons were props for dramas already performed and to be performed again in the afterlife. While this weaponry and the chariots have been given less consideration than the ritual vessels, their constant presence indicates their role both in practical warfare and in the marking of rank. Gifts of bows and arrows, and chariot parts and ornaments, are indeed the subjects of inscriptions inside ritual vessels. Thus ritual banquets joined together respect for the ancestors and concerns with the ceremony of a military society. Both enhanced the status of their owners, and this status was pertinent not just in the court of the day but also to the ancestors.

Linking all the processes described was the generalized notion that the afterlife of the Shang and the Western Zhou resembled life, structured by relationships within aristocratic families occupying metropolitan Henan and Shaanxi. A hierarchically arranged family, ordered by generational sequence, provided the model for the earthly state and for the spiritual realm. This ordered hierarchy was equivalent to the Western concept of a Kingdom of Heaven, with its supreme monarch and attendant angels and saints. Different individuals could no doubt elaborate their own views of the afterlife, according to their sense of their own roles or narratives within this generalized outlook. Indeed, while tomb types were in general terms standardized, small differences of personal detail occurred. Fu Hao owned an immense circular tripod (top of Fig. 10.4), which from its form, decoration and inscription, appears to have belonged to someone else before her. A vessel handed on in this way implies some sort of specific personal relationship. The owner of tomb 7 at Baoji Zhuyuangou (Fig. 10.5b) was buried with his concubine, who had her own personal and individual vessels. These tombs thus took on the characters and life histories of their occupants.

The tombs and pits for chariots and horses map the relationships of families and of individuals within families onto the afterlife, in the sense that they preserve an outline of the stage settings in which the narratives of the afterlife were now to be played out. The physical spacing of the burials, no doubt, conveyed information on hierarchical and family powers, information that was as present to the body as to the eye or to the mind. The Shang and Western Zhou have not left much in the way of imagery to supplement these spatial arrangements. A few traces of inlay of animal-like figures on wooden beams and coffins found in tombs indicate some sort of decorated setting. By contrast with activities in other parts of China, however, and in light of subsequent developments now to be discussed, the scenery was limited. This absence of the stage settings in which the kings and nobles were to enact their roles is made much more evident by the imagery produced in southern China.

The recent exhibition at the British Museum, *Mysteries of Ancient China* (Rawson 1996), highlighted the contrast between Shang society, dedicating its resources to bronze ritual vessels for a performance — that is, a mimetic display — and peoples of the southern areas along the Yangzi, where bronze was employed for massive images, that is for the stage settings for a narrative. The principal Shang and

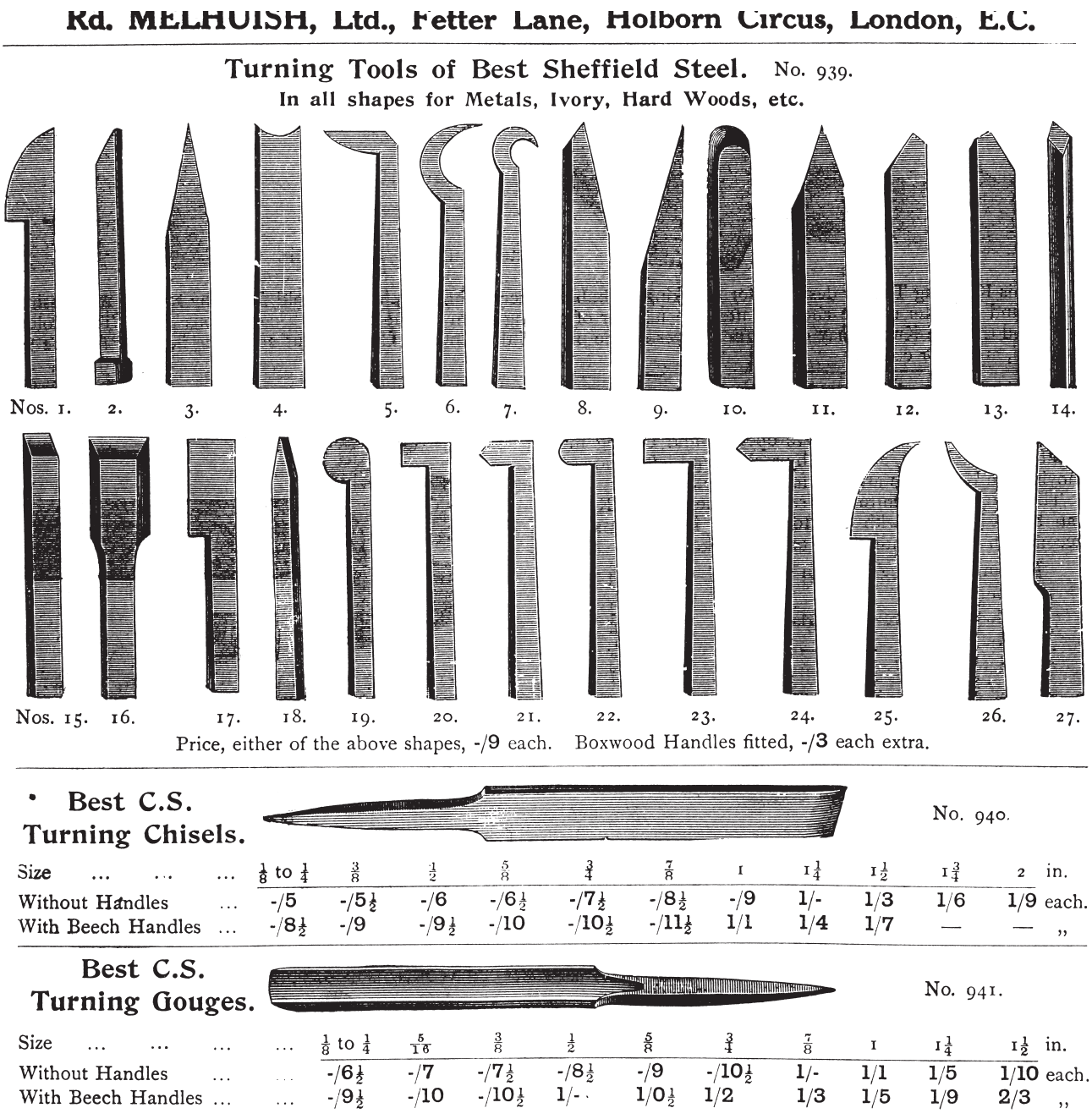


Figure 10.7. *Drawings of a set of steel turning tools, by Melhuish Ltd, c. 1913.*

early Zhou bronze vessels have to be contrasted with this extraordinary figurative imagery. In the large southern region, the rituals of the Shang were not practised, for complete vessel sets in the manner of those employed by the Shang and early Zhou were not made or used (Figs. 10.3 & 10.4). Instead, the precious materials of bronze and jade were employed quite differently. As several authorities have pointed out, bell music was a salient feature (Kane 1974; Bagley 1992). Large images of man-like figures (Fig. 10.8) (Rawson 1996, no. 22), monstrous masks (Fig. 10.9) and trees on which perched birds, indicate a yet different approach, this time staging a narrative, whose context had to be presented if it was to be understood by an audience. These bronze figures and trees offer settings for ceremonies, among whose performers were represented not just known individuals but spirits of some kind, whom we may

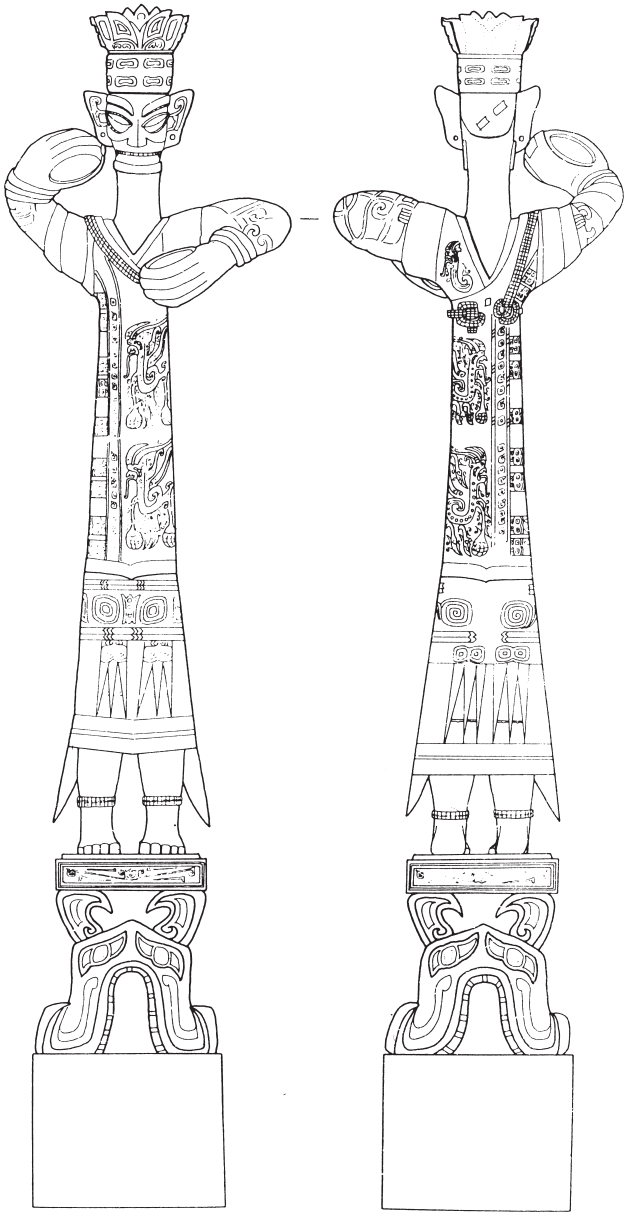


Figure 10.8. *Drawing of a cast bronze figure of a standing man from Guanghan county in Sichuan province, c. 1200 -1000* BC. *Height 262 cm. (After Wenwu 1989.5, 1–20, fig. 6.)*

presume were otherwise invisible. But these objects too are not fictions, but real presentations of feared and awesome beings of their makers' universe. I have already used the words stage set and apparatus; we could also describe the temple or tomb as a map or diagram of activities, relationships and beliefs for the afterlife (Tufte 1983; contrast Belting 1994 with Walton 1990 and Currie 1990). [5]

These new discoveries, from the western tributaries of the Yangzi and from other areas along the length of this immense river, show us that diverse cultures developed their own narratives, describing in objects the creatures and strange beings of their own worlds. Such revelations call into question a monolithic view of ancient China. The hierarchical societies of the Shang and Zhou, with their interest in banquets, chariots and archery, were not matched in this southern region. Here were sources of quite different views of the universe expressed in artefacts quite distinct from those of the centres along the Yellow River. Although study of the Yangzi area is as yet in its infancy, exploration of this region will surely demonstrate that China in the historical period brought together peoples from these quite distinct regions, whose artefacts created and enabled widely different practices and beliefs. This is evident in the amalgamation of some features from the two areas during the early days of the first empires of the third to first centuries BC.

Narratives in later tombs of the Eastern Zhou, Qin and Han periods

The two alternative methods of presenting accounts and interpretations of the spirit world, the performative and the narrative, continued in tandem during the later centuries BC. While some changes in tomb pattern during the Eastern Zhou (771–221 BC), the Qin (221–207 BC) and the Han (206 BC–AD 220), indicate substantial revisions in the ways in which the afterlife was represented and hence (we must presume) understood (Rawson 1996, 11–30), some of the fundamental tenets of ancient Chinese belief probably remained the same. There is no suggestion that the dead did not continue to live their lives in the afterlife, as they had done in this life. What seems to have changed was the sense of the appropriate range of 'sets' to include in the tomb. Such change indicates new activities and objects for those activities, and hence new ways of thought. These new attitudes and interpretations seem to have been a consequence of a gradual assimilation of southern practices of depicting the invisible, the spiritual world. In addition, the relationships of the living to the dead seem to have changed. Finally, until the advent of the Han dynasty at the very end of the third century BC, a wide diversity of practice and belief was found in the many distinct areas of the Chinese landmass.

Three tombs have been chosen to show that from the fifth century BC, and possibly earlier, the inhabitants of several different states (into which China was at this date divided) felt the need to extend the

scope of the tomb. Thus the tomb of the Marquis Yi of Zeng near the Yangzi (d. 433 BC) was set up as a house with separate rooms, one for each function: a coffin chamber with private utensils was for the Marquis to inhabit; a ceremonial, and thus public room, holding a magnificent bell set and sets of ritual vessels, as well as many other musical instruments, was at the centre of the tomb; an armoury held chariot parts and weapons; and a side room contained thirteen of the twenty-one women buried with the Marquis to accompany him in the afterlife and to play his musical instruments (Beijing 1989). The majority of items in the tomb were real, as in earlier burials. In addition to fine ritual vessels and the extraordinary set of bells, the tomb included such items of daily life as chests of clothes and sets of lacquer cups and travelling vessels, for everyday meals, in boxes. The standard approaches to burial had generated new variations on the ideal life, to embrace new practices and habits. But despite such changes, tombs continued their narrative or stage-set functions.

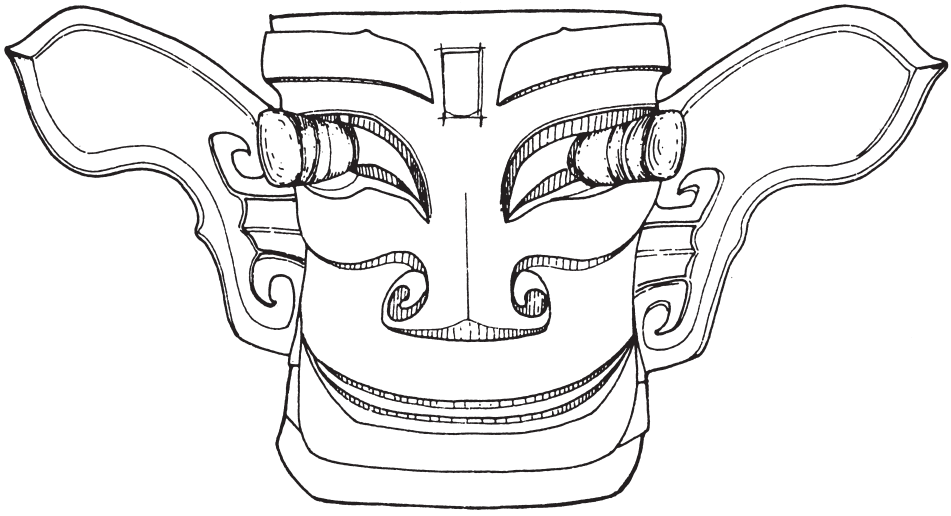


Figure 10.9. *Drawing of a large bronze mask on an imaginary being from Guanghan county in Sichuan province, c. 1200-1000 BC. Width 134 cm. (After Wenwu 1989.5, 1–20, fig. 13.)*

Now presentation went beyond a static tableau of the objects of life or the props for a performance. Pictures were included. Most striking among these was a large bronze figure of an imaginary bird, crowned with antlers (Fig. 10.10) (Rawson 1996, no. 63). Although of metal, with fine hard-stone inlay, it resembles wooden carvings, such as a crouching deer, also in the tomb. Here the southern interest in presenting figures of the spirit world has been engaged. Images were not confined to sculptures. Painted pictures were also included, among them a depiction of the creatures associated with the directions, the Dragon of the East and the Tiger of the West, shown with the names of the Lunar Lodges on a clothes box. Strange creatures holding weapons stand alongside the door and windows of the Marquis' inner coffin, probably guardians against evil spirits and demons (Fig. 10.11). Thus sculptures and pictures appear to present beings who could not otherwise be included in the tomb. It is likely that such images were considered useful, having the capacity to guard and support the owners of the tomb; they functioned, just as did utensils and bells. Most importantly, they were spirits quite distinct from the ancestors of the Yellow River tradition. In Hubei, beliefs most generally associated with the large state of Chu were influential, and it is from this region that such interests and beliefs came to be integrated with the later, Han period, beliefs and practices.

In the late twentieth century, we may view such images as representations of something not present. But in their day, it is likely that, as with images in the Mediterranean world of the sixth and seventh centuries AD (Belting 1994), these sculptures and paintings were taken as representations, being endowed with the powers of the spirits. In an important sense such images seem to have been viewed as having instrumental powers. We have no texts that would help us to sort out these possibilities precisely. The very presence of images, however, and their continuing development, suggest that, from this date at least, and perhaps earlier (especially in southern China), the ancient Chinese had complex notions of representation and presentation. In this area also wooden figures were widely used as servants and attendants, whose presence was no doubt as functional as the dishes of food that they were expected to serve.

The inhabitants of the western Qin state took another route, but in the same direction: they too made images of things that could not otherwise be included in tombs. Here in Shaanxi, the inhabitants favoured ceramic models of granaries and stoves essential for physical survival (Ledderose & Schlombs

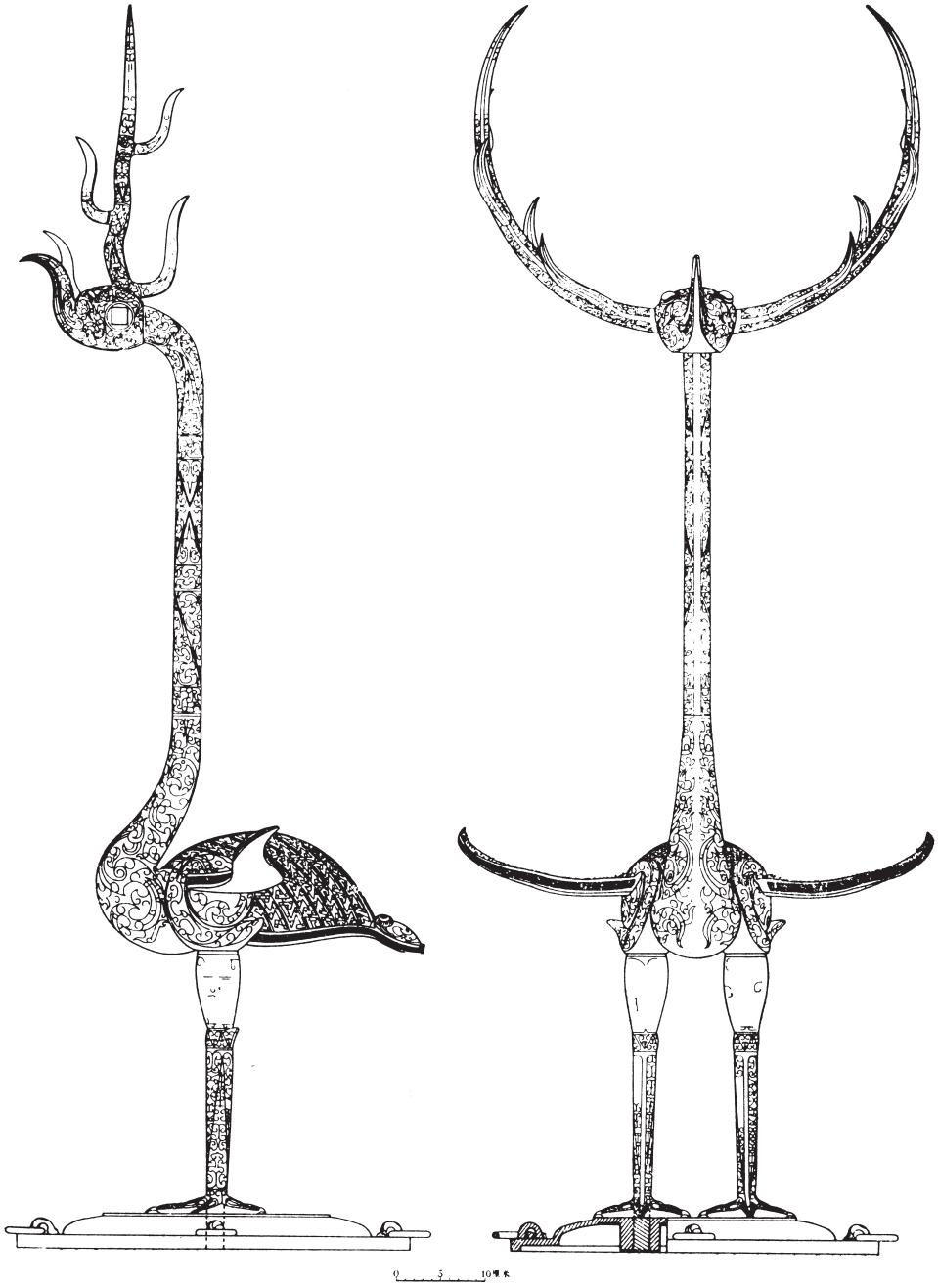


Figure 10.10. *Drawing of an imaginary bird crowned with antlers. From the tomb of the Marquis Yi of Zeng, d. c. 433* BC. *Height 143.5 cm. (After Beijing 1989, vol. 1, fig. 147.)*

1990, no. 25). The interests and traditions of the local peoples thus determined the representation or presentation chosen.

The grand army of terracotta warriors of the First Emperor (d. 210 BC) seems to combine features of both northern and southern traditions. These clay figures, equipped with real weapons and real chariots, continued the Zhou tradition of military might, by contrast with the spiritual guardians of the south. One writer, following the philosophical arguments of Kendall Walton in the realm of representational painting (as understood in a post-Renaissance world, one has to add), has termed such figures 'fictions' (Kesner 1995).[5] But such distinctions between copy and real, or fiction and real, belong to the philosophical world of the West and do not necessarily apply in China (Hall & Ames 1995). In their particular context of the soldiers were recognized as real by their makers and users. Indeed, as the day-to-day world was and is constructed by its occupants, so too could be the afterlife. Moreover, the Emperor would need a strong force to defend him in the afterlife, as he had in the battles that destroyed the lesser states. The terracotta soldiers were defences against the spirit armies of the afterlife, equivalent to the armed figures on the coffin of the Marquis Yi of Zeng.

From the perspective of the Emperor, we see the army as functioning in battle. From the perspective of the officials and workers, who toiled in its production, the army was testimony to another aspect of life, military and organizational power. The universe had been subdued by weapons and was now controlled by the hierarchies of a bureaucracy. To mobilize both armies of men and armies of clay required immense and highly controlled work forces. The very physical presence of rows upon rows of clay figures

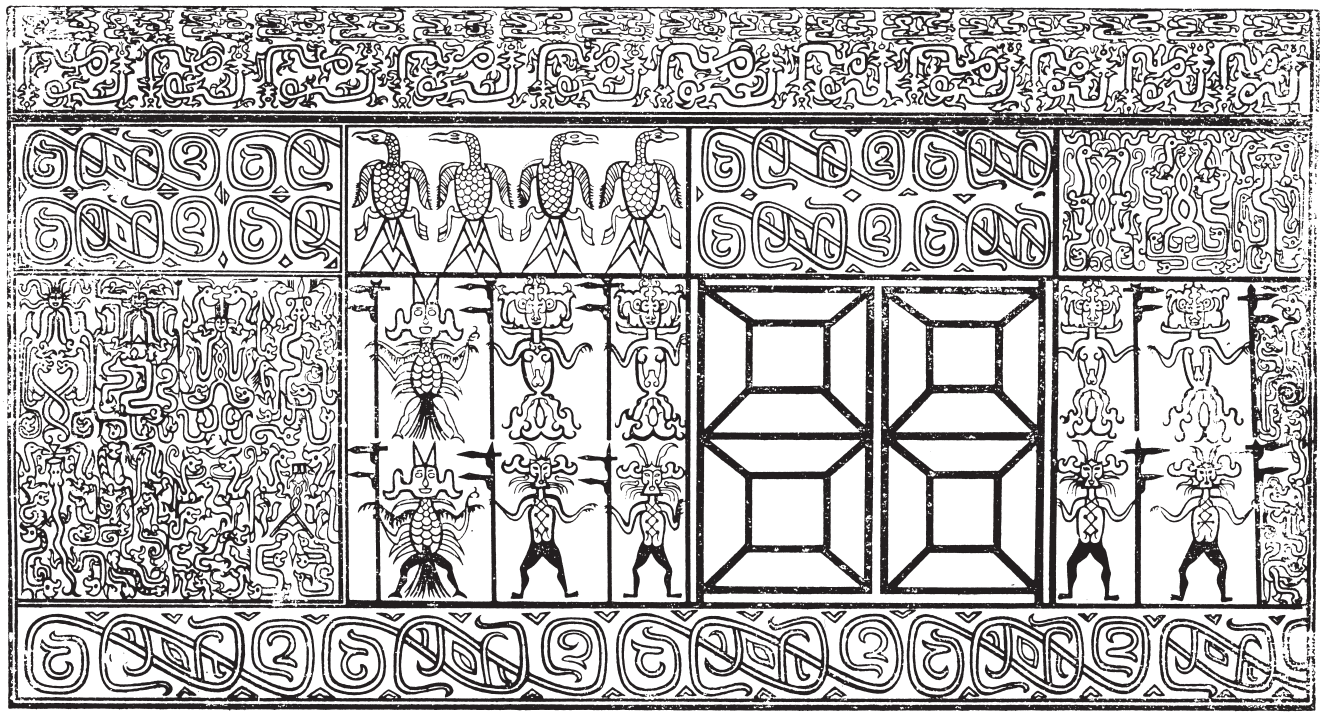


Figure 10.11. *Drawing of the painting on one side of the inner coffin of the Marquis Yi of Zeng. (After Beijing 1989, vol. 1, fig. 21.)*

would have impressed by their overwhelming ordered physical mass. Anyone seeing this impressive sight would have been in no doubt of the weight of the Emperor's might. Such an impact would have been as much emotional, embodied in a person's sense of personal fear, as in any intellectual understanding as to how the army was made and what it was to do. The careful display of armour and weapons, by both the human and the spirit army, indicated the degree of the Emperor's control, a control that extended far beyond the realms of war in everyday life and would subdue also the spirit realms.

The later, Han period, clay figures of soldiers, dancers and farm houses that we see as replicas were, therefore, in some essential sense also functional within the narratives of the afterlife. It is impossible for us today to be completely certain how the peoples of the time envisaged this transfer across the boundary of death. Later stories describe events in which tomb figures appear both as tomb figures and as actors in the drama of everyday life. They could change from one state to the other. For this reason, indeed, the Chinese have always been very wary of the figures and have not collected them as works of art. Tomb figures never appear in the early catalogues of collected antiquities, dating from the eleventh century AD onwards. Here we bring in the first mention of texts, but texts that fail to describe the feelings and functions we would like to know about. In artefacts and scene settings, however, we have objects that engaged their viewers in distinctive modes of interpretation, and hence of thinking, that are perhaps largely independent of thoughts expressed in texts. Indeed, such thoughts may not have been accessible to words and may never have been written down (Bloch 1991; Miller 1987).

Another reason for the lack of a coherent written account of Chinese beliefs is diversity, often probably an incompatible diversity. As already mentioned, the Qin unified the landmass of China and thereby brought many different religious practices and beliefs, burial customs and indeed narratives for life and afterlife together. The jade suit, belonging to the third tomb now to be discussed, brings objects and beliefs from yet different regions into the medley.

The prince, Liu Sheng, son of the Han dynasty Emperor Jingdi, was buried in 113 BC in a jade suit within a rock cut tomb in the cliff face near Mancheng in Hebei province (Beijing 1980b). The suit was carefully crafted, with more than two thousand carefully cut and polished bevelled plaques that were joined together with gold wire threaded through holes in

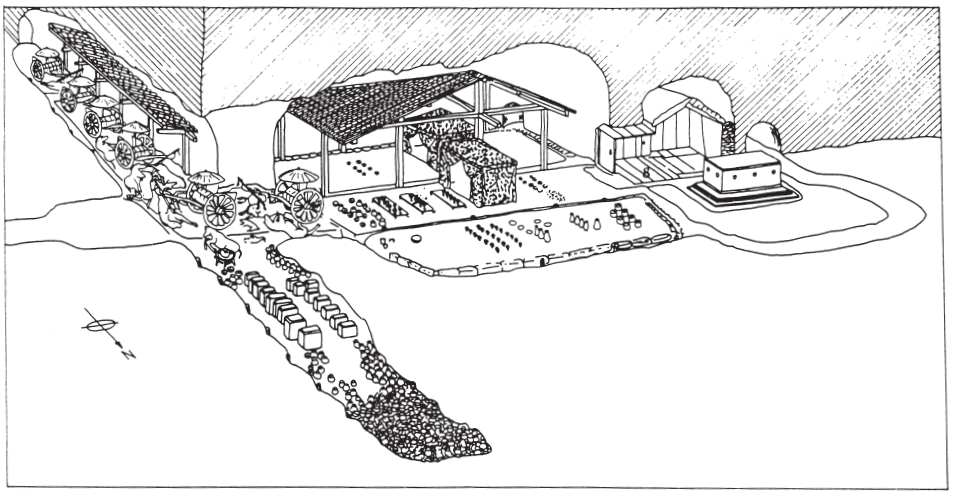


Figure 10.12a. *Drawing of the tomb of Liu Sheng, d. 113 BC, at Mancheng in Hebei province. (After New York 1980, fig. 112.)*

the corners of each plaque. This suit belonged to a long tradition, in which jades were threaded with beads and laid over the body. Such jades first began to be used in the late Western Zhou period, following the ritual changes mentioned above. Among the profusion of jades were plaques cut to fit over the features of the face. Yet the chronological development of such jade coverings from the ninth century BC down to the time of Liu Sheng did not lead logically to this rather formidable, armour-like, casing of systematically carved plaques. Indeed, between 850 and 150 BC, the numbers of jades buried appears, if anything, to have declined slowly and unevenly.

Yet from before the time of the Emperor Han Wudi (141–87 BC), jade suits seem to have been made on a sufficiently large scale to distribute them to a number of members of the Imperial Family. So carefully made were these suits and so similar to one another that some sort of prototype or model appears to have existed. Indeed, it is likely that the suits were made in an Imperial workshop, commissioned by the Emperor's household. As with the terracotta warriors, jade suits are difficult to comprehend without postulating large-scale, highly organized workshops, directed by overseers who could plan because they had a notion of exactly what they wanted to achieve. It is possible that precedents for these jade workshops existed in eastern China, where large-scale burials of jades, before or at the beginning of the Han dynasty, have been discovered. The Emperor's workshops may have exploited such skills and brought suits into being by multiplying jade plaques until they covered a body, perhaps by analogy with armour of iron.

For along with a large labour force directed to a particular practical end, an additional motive or objective is implied by the investment of huge quantities of labour in jade carving for a suit. It seems likely that such a suit was thought to confer special benefit on its owner. Perhaps the tightly linked plaques were believed to constitute protection, that is armour, against demons and spirits. Here we can suggest that analogies were at work. The form of protection chosen was comparable to that of a suit of armour; the material chosen, however, was not that for defence against human forces. Jade was thought more suitable, again perhaps because of an analogy — the permanence of the jade might protect permanently and confer deathlessness on the wearer. In this light we can see the jade suit as a defence against unseen forces, as was the terracotta army.

The powers of the jade suit were reinforced by the stone of the prince's tomb itself. His burial chamber was dug deep into a hillside. The jade suit lay within a coffin in an inner chamber, itself constructed of stone slabs at the heart of the mountain, down a long passageway and beyond a large central chamber. This inner chamber had its own separate stone door and the tomb was sealed with rubble and molten iron. In the prince's inner chamber were small figures of servants, also carved in stone. In the central ceremonial chamber, such servant figures were ceramic, as were those in the tomb of his consort, Dou Wan. Thus only those figures nearest the body of the prince were of the most durable material, stone. The jade suit is probably the key to the physical and intellectual intention. The jade suit, the stone attendants, the stone slab-lined inner chamber and the tomb at the heart of the mountain may have all had the same purpose, to lend the qualities of the materials literally and by analogy to the future life of the prince. Moreover, these precautions were

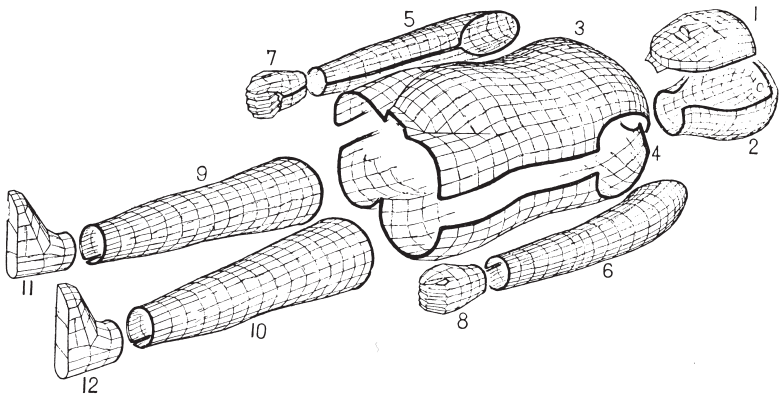


Figure 10.12b. *Drawing of the reconstructed jade suit of Liu Sheng from Mancheng. (After Beijing 1980b, vol. 1, fig. 227.)*

neither literally not metaphorically redundant. If we think so, we forget the power of visual information. Just as in speech and writing, a multiplicity of versions of the same idea can be used to elaborate and explain, so also a variety of visual forms can develop and thus expound a concept. The separate elements of the tomb elaborated the ways in which the prince might be protected. The strength of the mountain fortress was to give eternal life to the prince. It was also to separate clearly the worlds of the living and the dead. From the Han period, or possibly earlier, the living wished to keep a good distance from the dead — who might appear as ghosts to plague them (Seidel 1987; Wu Hung 1994). Thus the three tombs we have reviewed illustrate two major categories of activity and thought. They all present several diverse facets or functions of life with emphases on the most auspicious aspects; and they also all provide for elaborate defences, especially against the implied trials and dangers of the spirit world. Moreover, we can see the ideas about suitable forms of protection being worked out by manipulation of physical objects that thus became integral to those ideas.

Deities, as well as demons and spirits, were recognized as assisting the tomb occupants. This is illustrated by a number of high-quality objects in Liu Sheng's tomb and other contemporary burials. Among them were representations of auspicious, miraculous creatures of the universe (developing the practices in the tomb of the Marquis Yi: Fig. 10.10). Such images were of the finest materials, especially inlaid bronze and jade, and they appear as supports for lamps or roaming over peaked incense burners in the shapes of hills. Other images of deities, such as the Queen Mother of the West, occurred on mirrors or on strange bronze concoctions, known as 'money trees' from the coins that filled the branches on which the small images of the deity were placed (Rawson 1996, nos. 87 & 88). During the Qin and Han periods, we know from texts, as much as from material culture, that deities who inhabited distant islands in the eastern sea or the western mountains cultivated drugs of immortality. If the powerful rulers of the day could send missions to these immortal lands, they too might obtain such drugs and achieve deathlessness. Missions failed, as we know from the writings of the great historian Sima Qian. But his account also shows that there was a general belief that spirits would be attracted by objects that resembled them.

Shaoweng then said to the emperor, 'I perceive that Your Majesty wishes to commune with the spirits. But unless your palaces and robes are patterned after the shapes of the spirits, they will not consent to come to you' (Watson 1961, vol. 2, 42).

Here in the lamps and incense burners, mirrors and money trees, we have representations acknowledged as representations, that were, by their representational qualities, to draw the real thing to them. But when buried in tombs, these objects were to remain themselves in the sense that they were to continue to exist in bronze — they would presumably not turn into mountainous rocky peaks, with miraculous beasts perched upon them. Instead, as with the utensils of earlier times, they would, perhaps, continue to have their earthly function, that is, to attract the spirits and immortals to the aid of their owners. Thus as well as preparing for a life in the tomb, the peoples of the late Zhou, Qin and Han periods depicted a variety of deities and spirits in their tombs, for in the afterlife, as in the living world, these deities would function and assist the tomb

occupant.

The three different examples also show that, as with the earlier tomb types, the contents were the props for a narrative of the tomb occupant that continued his earthly life into the afterlife. From the equipment in a tomb it is possible to see what their owners deemed essential, and from such priorities we can derive an understanding of what they thought. Indeed, examination of widely differing, even contrasting, tombs proves a useful approach. While the granary and army were merely a simple extension of daily life, the figures of strange beings imply a more elaborate conception of both life and the afterlife, one peopled by good and bad spirits, more threatening than the ancestors had been. None of the three later tombs can be understood, unless it is recognized, as the Chinese themselves must have done, that the world was inhabited by a wide range of strange and often dangerous spirits. In all three tombs defences were mounted — in the form of guardian spirits, of terracotta soldiers and of jade suits — which explained to their owners the nature of the dangers and the routes to safety and success that they might be granted. Alongside the fearsome creatures of the spirit world were also to be found benign deities. Yet despite the elaborate burial preparations, few texts, if any, enable us to glimpse how the Chinese formulated their interpretations of the universe.[6] At this point the disjunctions between the narratives set out in the tombs and the written theories of the late Zhou, Qin and Han periods, expounded in a few of the surviving texts, become very noticeable.

Ideas and theories

Throughout the discussion we have assumed a theoretical as well as a performative or narrative view. The time has come to address some aspects of this major issue. It is not possible here to describe the dense history of intellectual culture recorded in ancient canonical Chinese texts. Few of these are as early as the ritual performances of the Shang or Western Zhou. Indeed, the majority were compiled in their present forms only in the Eastern Zhou and Han periods. These later texts, which include both historical records and anecdotes and the major philosophical works, lie, in the main, outside the principal issues considered here. The syntheses compiled in the Han period are relevant to the matters described, but let us summarize some of the theoretical intentions and interpretations implicit in the burial practices discussed, mentioning texts found in tombs that illumine such notions.

For theories of some sort were expressed by even the very simplest of rituals and burials. Indeed, I have suggested that both the surviving objects and the very few texts indicate that the Shang and Zhou saw their universe as dominated by hierarchically arranged generations of ancestors. It is likely that these views were those of the Shang in the first place and that the Zhou, entering the Yellow River area from the relative obscurity of the northwest, took over many Shang practices and hence also beliefs, reworking them in their own way. Indeed, early Zhou poetry assembled in the *Shi jing* (compiled in about 600 BC, but dating to a much earlier time) describes their origins in genealogical terms, giving their own twist to the Shang generational pattern. Both Shang and Zhou ancestors seem to have been concerned with the activities of court life, especially banquets to honour them, court ceremony and military power. Nowhere are these views systematically expounded, and perhaps they did not have to be. We have inferred them from the artefacts, and such artefacts may indeed have expressed the particular forms of these notions for their makers and users.

We can see both from objects and texts that much of this outlook survived in the Yellow River region after the fall of the Zhou capital in the west in 771. When the Zhou capital was overrun, the Zhou kings and nobility moved eastwards, along the Yellow River, but they also spread southwards towards the Yangzi. Concurrently the state of Chu, which may originally have been located in western China — that is southern Shaanxi or Sichuan — began to reform in Hubei. Chu was to become the dominant power in central southern China. These two developments brought a Chinese speaking and writing élite to power in the middle Yangzi area, the region where the tomb of the Marquis Yi of Zeng was found. This Chinese speaking élite became the principal intermediary through which religious notions of the south were adopted and adapted in a Chinese environment. Indeed, in the Han period, it was through Chu that southern ideas were transmitted to and integrated into what became the metropolitan Chinese culture of the Han. In this way, Han thought, and consequently that of later dynasties also, came to combine the hierarchical and genealogical systems typical of the Yellow River with the much more varied beliefs of the south.

We can illustrate these two components in textual form in early anthologies of poetry: the *Shi jing*, already mentioned, and the *Chu ci*, the poetry of the Chu state, assembled in the early Han period, but

dating in part from the pre-Han period. In the earlier Zhou poetry, the ancestors, the genealogical legends of the Zhou, and the military adventures of ordinary beings, as well as heroes, play a large part. The *Chu ci* brings out a completely different universe of spirits and demons, of deities located in the heavens especially amongst the stars, and of heavenly journeys in carriages drawn by dragons.

But even as early as the time of the time of the Marquis Yi of Zeng, it is clear from the actual tomb contents that compromises and syntheses between traditional ancient Zhou expectations and southern spiritual realms were being made. Buried in the rear chamber of the Marquis' tomb (which held weapons and chariot parts) was an inventory that listed these items as gifts from powerful associates of the Marquis (Beijing 1989). While the gifts were themselves in keeping with much earlier Zhou military values, the inventory buried in the tomb was not. Such inventories may have existed at earlier dates, but they do not, on present evidence, seem to have been buried. It is likely that the burial of the inventory was not chance, but was intended to demonstrate for all time that the Marquis not only had wonderful possessions but also that he had powerful friends.

The inventory is the first in a long series found in southern tombs, preserved because the conditions underground kept the bamboo strips on which they were written intact. Many of the Chu state inventories were evidently intended for the bureaucrats of life to check against the objects to be buried, and they were often corrected in the light of the burial. When placed in the tomb it seems likely that they were to continue to have a use. We can speculate that that use was to be in the future life of the tomb owner. In Han times, some of the inventories were addressed explicitly to an underworld bureaucracy that, in the minds of the peoples of many parts of central China, regulated the spirit world, and especially the ranks of the dead.

We know that notions of such bureaucracies existed well before the Han dynasty from narratives, also written on bamboo slips, found in a northwestern tomb of the third century BC (Harper 1994). This document describes how one, Dan, returned to life, having been summoned to the underworld in error. In his report he mentioned, incidently, that in this underworld realm were famous official figures of the past. Writing tools — ink, brushes, ink stones for grinding the ink pellets and tools for preparing bamboo slips carefully included in the coffins of the southern tombs are, perhaps, also evidence that the tomb occupants themselves hoped to serve in some official capacity (Rawson 1996, nos. 69 & 95). Many other texts have been found. These embrace treatises on such matters as law, medicine and demonology, useful in life to their owners, and presumably also useful in the after life (Harper 1985; 1987). In addition, later Han tombs hold documents, such as land contracts for the piece of land on which the tomb was constructed, that were addressed, it would seem, to the officials of the underworld (Seidel 1987). The later Han documents also include texts written on jars that were pleas on behalf of the dead, presumably before the officials of the underworld (Dien *et al*. 1985, 1360). Such texts do not elaborate theory; they functioned, as did all the objects in the tombs, as part of the essential apparatus of their owner, enabling him or her to act and to think.

Only in the last ten years has the underworld bureaucracy and its celestial counterpart been identified from tomb documents (Seidel 1987). Han period documents, dating from the first century AD, include references to a principal deity, the Celestial Thearch. The celestial realm, like that of the underworld, was organized in a hierarchical manner, with deities associated with different stars and celestial offices manned by spirits. Elements of this structure were already present in the poems of the *Chu ci*, and it is likely that the notions of both the underworld and the heavenly officials were developed in response to the beliefs of the south, as interpreted in Chu. Indeed, while the documents in Han tombs present a fairly ordered account of these realms, there were probably many earlier centuries when such notions were only partially evolved. Thus one of the forces that led to the concept of such ordered realms was probably the fear of the many demons and spirits current in the south. Texts on dreams, medicine and demonology give every evidence of these fears (Harper 1985; 1987). The hierarchical organization, on the other hand, may have come from the traditional ordering by rank and function current in the Yellow River region. Indeed, parallel with the integration of northern Yellow River material culture with southern images described above, there seems to have been an integration of different categories of belief system from several regions of China.

A recent discussion of a strange deity figure supports such an account. This figure, known by the name of Taiyi, decorates a weapon from the Chu state (Fig. 10.13). Divination texts also found in Chu tombs reveal the powers of this spirit, who could avert danger from weapons. In the Han period, the Emperor Wudi (141–87 BC) integrated the worship of Taiyi into the formal metropolitan sacrifices for the

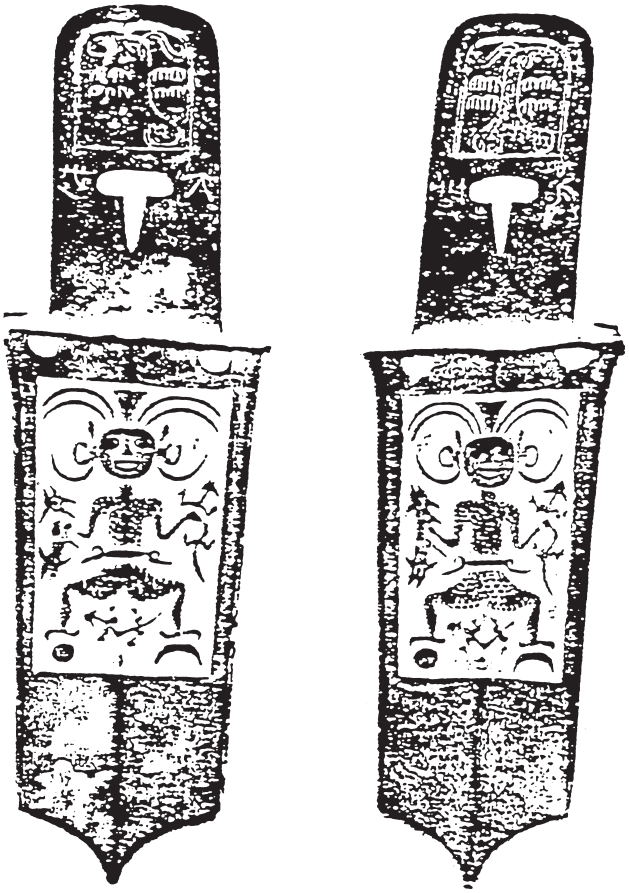


Figure 10.13. *Rubbing of the two sides of a halberd found at Baoshan in Jingmen county, Hubei province. 4th–3rd century* BC. *Height 22 cm. (After Li Ling 1995, fig. 4.)*

major deities of the heavens and the earth (Li Ling 1995). Until recently, the southern origins of this major figure in Han ritual and religion had been ignored. Now it is evident that this powerful Han emperor was intent on seeking help and support from deities throughout his large empire to assist his rule and to preserve him from ill fortune. As the Imperial family had strong contacts with the south and with Chu, in particular, beliefs from that region were gathered into the ideas popular at the court.

The late Zhou, Qin and Han periods were indeed key moments when diverse beliefs and theories, hinted at by the contents of the later tombs, were drawn into systematic philosophy. Often known as correlative philosophy, such ideas joined well-established social and political philosophy expounded in the writings of Confucius and Mencius or those of the Mohists (Hall & Ames 1995; Graham 1989). At the same period, writings on ritual, often containing ancient material, were edited to make available compilations of important practices. These efforts at synthesis and compilation were driven by searches for coherence amid the plethora of beliefs and philosophies available at the time. But such textual accounts did not necessarily match the beliefs and practices of the peoples in different regions of China. Some of the disjunctions between burial practices and theoretical writing were not simply differences in categories of thought, but also a consequence of the separate enterprises.

As we have seen in the description of the three tombs, different peoples and cultures were gradually incorporated into the Chinese-speaking world, and finally into a single state, bringing new views to the generally accepted ancient traditions, dominated by the ancestors and manipulated by family loyalties. Such accounts of demons and spirits, expounded in images and buried documents, illustrate the power of accounts set out in the physical terms of utensils and images. Moreover, it is perfectly clear from detailed attention to burial that beliefs expressed in such practical and physical contexts were widely shared from the highest social level to the lowest. The divergences between reported views of Confucius and much later philosophers, including the famous sceptic Wang Chong, and dependency on the spirit guardians of the Marquis Yi of Zeng, on the army of the First Emperor and on the jade suit of Liu Sheng, indicate a wide gulf between the most theoretical expositions and the performative and narrative structures of understanding. It is, perhaps, a common sensation of all peoples that their views are not necessarily consistent from one section of their lives to another. At the time of preparation for burial (often carried out many years before the actual death), an overwhelming need was to ensure a comfortable afterlife. The desire for one that conformed, and hence was coherent with the highest norms of earthly life, led to repeated emphasis on conditions for continuity across the boundary.

In Chinese tombs, therefore, we see not just one but many patterns of thought. Given that in many cultures personal beliefs often differ from those of the metropolitan orthodox religious and philosophical canon, physical remains that reveal elements of ritual performance and narrative are highly important sources of information. They are not only information for us today; their essential role was to inform their owners. Such information indicates a diverse material culture that presumably mirrored a diverse intellectual one. The marked regional differences here noted were not simply an aspect of an early stage in the period of the Shang, *c.* 1200 BC, but persisted

much later into the Eastern Zhou and Han periods. Whole complexes of objects that differed region by region indicate widely separate rites, rituals and beliefs. The ritual vessels would have impressed by their movement in ordered rituals in which sequences of offerings were tied to the individual vessels within a set. The towering bronze sculptures, on the other hand, would have dominated their audiences by their impassive unmoving countenances. The bodily experiences, the emotions and the ideas would have been strongly influenced by such material differences. In this context, artefacts are most usefully considered not as symbolic storage so much as integral components of the beliefs, hopes and fears of their makers and users.

Acknowledgements

I would like to thank Ann Searight for preparing the illustrations.

Jessica Rawson
Merton College
Oxford
OX1 4JD

Notes

1. Although the paper addresses specific issues in Chinese material culture, the main argument that objects of all categories are integral to the creation and development of what we think of as abstract concepts or belief can be applied to all cultures (Stein 1990). Such an approach is supported by recent work on cognition expounded in Clark 1997.
2. The notion of objects as texts has had a wide currency in the last two decades. Such an approach, however, gives unwarranted priority to the written word and indeed also to language. Fundamental to this present paper is the view that the manifold features of artefacts are not capable of expression in words written or spoken. Indeed, our assessment and exploitation of signs and writing, in particular, can be seen to be based upon the ways in which we interpret objects and environments.
3. This paper will not explore the wide-ranging technical knowledge displayed by the ancient Chinese artefacts discussed in this paper. Among such examples, the bell sets in the fifth century tomb of the Marquis Yi of Zeng (Beijing 1989), reveal extraordinary command both of casting technique and musical vibration patterns. Neither have I considered the cognitive processes that such technical command required.
4. Throughout the paper it is accepted that the theories that contributed to the burial patterns here discussed were part of a typically Chinese perspective and cannot be assimilated to Western philosophical or religious thinking (Hall & Ames 1995). Given this perspective, it is unlikely that the Chinese viewed the tomb contents as merely 'representations'.
5. Wide-ranging discussion of fiction may be suitable in a Western context, but is not reliably applied to the ancient Chinese one.
6. Among the many theories floated whenever Chinese burial practices are described are the propositions about ancient Chinese notions of the soul. A number of writers have attempted to derive systematic notions of the soul and its destination from texts of the Han and earlier periods (Yü Ying-shih 1964). Here, as in the other aspects described, however, it is evident that the textual accounts, and modern interpretations of those accounts, are not consistent with the burial patterns of the day. A division of the soul into a heavenly *hun* soul and an earthly *po* soul is mentioned haphazardly in historical and philosophical texts. But it is by no means obvious that the burial practitioners and their patrons subscribed to these views (see especially Brashier 1996). In such accounts, the *hun* portion of the soul is said to ascend to heaven, while the *po* soul remains in the tomb. Yet evidence of a search for bodily preservation is seen in jade suits (Fig. 11.12b). How did that search relate to either the fate of the *hun* or of the *po* soul? The other tombs described are also hard to explain in the context of a divided soul.

References

Bagley, R.W., 1992. Changjiang bronzes and Shang archaeology, in *International Colloquium on Chinese Art History, 1991, Proceedings, Antiquities,* part I. Taipei: National Palace Museum, 209–55.

Baxter, L.A., 1992. Root metaphors in accounts of developing romantic relationships. *Journal of Social and Personal Relationships* 9, 253–75.

Beijing, 1980a. *Yinxu Fu Hao mu*. Beijing: Wenwu chubanshe.

Beijing, 1980b. *Mancheng Han mu fajue baogao*. Beijing: Wenwu chubanshe.

Beijing, 1981. Anyang Xiaotun cunbeide liangzuo Yindai mu. *Kaogu xuebao* 1981(4), 491–518.

Beijing, 1989. *Zeng Hou Yi mu.* Beijing: Wenwu chubanshe.

Belting, H., 1994. *Likeness and Presence: a History of the Image Before the Era of Art*, trans. E. Jephcott. Chicago (IL) & London: University of Chicago Press.

Black, M., 1962. *Models and Metaphors.* Ithaca (NY): Cornell University Press.

Bloch, M., 1991. Language, anthropology and cognitive science. *Man* 26, 183–98.

Brashier, K.E., 1996. Han thanatology and the division of 'souls'. *Early China* 21, 125–58.

Carrithers, M., 1992. *Why Humans have Cultures: Explaining Anthropology and Social Diversity*. Oxford: Oxford University Press.

Carruthers, M., 1990. *The Book of Memory: a Study of Memory in Medieval Culture.* Cambridge: Cambridge University Press.

Clark, A., 1997. *Being There: Putting Brain, Body, and World Together Again.* Cambridge (MA): MIT Press.
Connerton, P., 1989. *How Societies Remember.* Cambridge: Cambridge University Press.
Currie, G., 1990. *The Nature of Fiction.* Cambridge: Cambridge University Press.
Damasio, A.R., 1994. *Descartes' Error, Emotion, Reason and the Human Brain*. New York (NY): G.P. Putnam's Sons.
Dien, A.E., J.K. Riegel & N.T. Price, 1985. *Chinese Archaeological Abstracts*, vol. 3: *Eastern Zhou to Han.* (Monumenta Archaeologica 10.) Los Angeles (CA): the Institute of Archaeology, University of California.
Dipert, R.R., 1993. *Artefacts, Art Works, and Agency*. Philadelphia (PA): Temple University Press.
Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.
Fong, W. (ed.), 1980. *The Great Bronze Age of China: an Exhibition from the People's Republic of China*. New York (NY): The Metropolitan Museum of Art.
Goffman, E., 1969. *The Presentation of Self in Everyday Life.* Harmondsworth: Penguin.
Goodman, N., 1976. *Languages of Art: an Approach to a Theory of Symbols*. Indianapolis (IN): Hackett Publishing Co. Inc.
Goodman, N., 1984. *Of Mind and Other Matters*. Cambridge (MA): Harvard University Press.
Goodman, N. & C. Elgin, 1988. *Reconceptions*. Indianapolis (IN): Hackett Publishing Co. Inc.
Graham, A.C., 1989. *Disputers of the Tao: Philosophical Argument in Ancient China*. La Salle: Open Court.
Guthrie, S., 1993. *Faces in the Clouds: a New Theory of Religion.* New York (NY) & Oxford: Oxford University Press.
Hall, D.L. & R.T. Ames, 1995. *Anticipating China: Thinking Through the Narratives of Chinese and Western Culture*. Albany (NY): State University of New York Press.
Harper, D., 1985. A Chinese demonography of the third century BC. *Harvard Journal of Asiatic Studies* 45, 459–98.
Harper, D., 1987. Wang Yen-shou's nightmare poem. *Harvard Journal of Asiatic Studies* 47, 239–85.
Harper, D., 1994. Resurrection in Warring States popular religion. *Taoist Resources* 5, 13–28.
Hausman, C., 1989. *Metaphor and Art: Interactionism and Reference in the Verbal and Non-verbal Arts*. Cambridge: Cambridge University Press.
Hawkes, D., 1985. *The Songs of the South: an Anthology of Ancient Chinese Poems by Qu Yuan and Other Poets*. Harmondsworth: Penguin.
Hinde, R., 1997. *Relationships: a Dialectical Perspective*. Hove: Psychology Press.
Hodder, I., 1986. *Reading the Past*: *Current Approaches in Interpretation in Archaeology.* Cambridge: Cambridge University Press.
Kane, V., 1974. The independent bronze industries in the south of China contemporary with the Shang and Western Chou Dynasties. *Archives of Asian Art* 28, 77–107.
Kemp, B.J., 1989. *Ancient Egypt: Anatomy of a Civilization*. London & New York (NY): Routledge.
Kesner, L., 1995. Likeness of no one: (re)presenting the First Emperor's army. *The Art Bulletin* 77(1), 115–32.
Lakoff, G. & M. Johnson, 1980. *Metaphors We Live By*. Chicago (IL): Chicago University Press.
Lamarque, P. & S.H. Olsen, 1994. *Truth, Fiction and Literature.* Oxford: Clarendon Press.
Ledderose, L. & A. Schlombs (eds.), 1990. *Jenseits der Grossen Mauer: Der Erste Kaiser von China und Seine Terracotta-Armee.* Munich: Bertelsmann Lexikon Verlag GmbH.
Li Ling, 1995. An archaeological study of Taiyi (Grand One) worship. *Early Medieval China* 2(1995–96), 1–39.
Lu Liancheng & Hu Zhisheng, 1988. *Baoji Yuguo mudi*. Beijing: Wenwu chubanshe.
Miller, D., 1987. *Material Culture and Mass Consumption*. Oxford: Basil Blackwell.
Miller, G.A., E. Galanter & K.H. Pribram, 1960. *Plans and the Structure of Behaviour*. New York (NY): Henry Holt & Co.
Ortony, A. (ed.), 1979. *Metaphor and Thought*. Cambridge: Cambridge University Press.
Pearce, S.M. (ed.), 1994. *Interpreting Objects and Collections*. London & New York (NY): Routledge.
Pomian, K., 1990. *Collectors and Curiosities, Paris and Venice, 1500 –1800*, trans. E. Wiles-Portier. Cambridge: Polity Press.
Rawson, J., 1993a. Ancient Chinese ritual bronzes: the evidence from tombs and hoards of the Shang (*c.* 1500–1050 BC) and Western Zhou (*c.* 1050–771 BC) periods. *Antiquity* 67, 805–23.
Rawson, J., 1993b. Ancient Chinese ritual as seen in the material record, in *State and Court Ritual in China*, eds. J. McDermott & J. Laidlaw (forthcoming). Paper presented at a symposium at Cambridge in 1993.
Rawson, J., 1996. *Mysteries of Ancient China. Archaeological Finds from the Early Dynasties*. London: British Museum Press.
Renfrew, C., 1986. Varna and the emergence of wealth in prehistoric Europe, in *The Social Life of Things*, ed. A Appadurai. Cambridge: Cambridge University Press, 141–68.
Renfrew, C. & E. Zubrow (eds.), 1994. *The Ancient Mind: Elements of Cognitive Archaeology.* Cambridge: Cambridge University Press.
Romney A.K., J.P. Boyd, C.C. Moore, W.H. Batchelder & T. Brazill, 1996. Culture as shared cognitive representations. *Proceeding of the National Academy of Sciences*, USA 93, 4699–705.
Schier, F., 1986. *Deeper into Pictures: an Essay on Pictorial Representation*. Cambridge: Cambridge University Press.
Seidel, A., 1987. Traces of Han religion in funeral texts found in tombs, in *Dōkyo¯ to sho¯kyo¯ bunka,* ed. Akizuki Kan'ei. Tokyo: Hirakawa, 21–57.
Stein, R.A., 1990. *The World in Miniature: Container Gardens and Dwellings in Far Eastern Religious Thought,* trans. Brooks. Stanford (CA): Stanford University Press.
Tufte, E.R., 1983. *The Visual Display of Quantitative Information.* Cheshire (CT): Graphics Press.
Waley, A., 1954. *The Book of Songs*. London: George Allen and Unwin.

Walton, K., 1990. *Mimesis as Make-believe: On the Foundations of Representational Art*. Cambridge (MA): Harvard University Press.

Watson, B., 1961. *Records of the Grand Historian of China Ssu-ma Ch'ien*, 2 vols. New York (NY): Columbia University Press.

Watson, B., 1993. *Records of the Grand Historian: Qin Dynasty*. Hong Kong & New York (NY): Columbia University Press.

Wu Hung, 1994. Beyond the 'Great Boundary': funerary narrative in the Cangshan tomb, in *Boundaries in China*, ed. J. Hay. London: Reaktion Press, 81–104.

Wylie, M.A., 1982. Epistemological issues raised by a structuralist archaeology, in *Symbolic and Structural Archaeology*, ed. I. Hodder. Cambridge: Cambridge University Press, 39–46.

Wylie, M.A., 1993. A proliferation of new archaeologies: 'Beyond objectivism and relativism', in *Archaeological Theory: Who Sets the Agenda?*, eds. N. Yoffee & A. Sherratt. Cambridge: Cambridge University Press, 20–26.

Yü Ying-shih, 1964. Life and immortality in the mind of Han China. *Harvard Journal of Asiatic Studies* 25, 80–120.

Yü Ying-shih, 1987. O Soul, Come Back! A study in the changing conceptions of the soul and afterlife in pre-Buddhist China. *Harvard Journal of Asian Studies* 47, 363–95.

Chapter 11

Social Relations and the Idea of Externality

Marilyn Strathern

The concept of external storage system raises the question of what is or is not 'external' to the person. This chapter offers an ethnographic commentary. Materials from Papua New Guinea lead one to consider the significance of social relations in this respect. The chapter is not so much concerned with relations as storers of information but with specific practices in which people lodge (store) material items in (with) other people. It is argued that these practices create one of the conditions by which people compute what is interior and what is exterior (to themselves), namely through the very fact of their enrolling other persons in their projects. It is further argued that any single difference, as between internal and external, depends on other differences also being held in place. The chapter thus explores some of the supporting conceptual structures which enable these people to imagine that they are able to give out and take in resources of different kinds, thereby created as alternately 'internal' and 'external' to themselves.

More than one contributor to this volume has commented on the part that social relations have to play in any account of human experience. We might also consider them a rather special resource in the development of external symbolic storage systems. Social relations make artefacts out of persons; that is, persons carry the kind of symbolic load that Renfrew (this volume) finds in material culture. What makes them special is their recursive and elicitory character.

Quite apart from the collective sense in which separate minds might be said to be embedded in any evolving culture (*cf.* Donald 1993, 12), ongoing relationships afford certain looping possibilities. That is, people's 'working memory' (Donald 1991, 329) loops through other people. Social relations do not just contain a record of past interactions or store information about future behavioural possibilities. They act also as a stimulus to reflection. This social reflexivity is crucial, for instance, to what Esther Goody (1995) has called the role of anticipatory interactive planning in human cognition. In addition to the fact that actions are linked to response, and that persons become aware of others thereby and of themselves through others, is the capacity to reflect on interdependence itself. We might say that the entire loop is given a dimension of time (enduring obligations, over the generations) and space (between persons separated by biography or residence from one another) when social relationships themselves become objects of reflection and manipulation. We may add that the possibility of long-term relationships in which people anticipate the (dis)positions of others in relation to themselves also allows the same planning strategies to be mobilized at high speed in transient interactions. Long-term relationships are in turn sustained through the generic conditions or constraints (rules of behaviour) expected of persons in particular locations (roles) in relation to one another.

This seems self-evident enough. Here I bring to mind certain ethnographic data, some of it well known, in order to make one further point. If social relations are not external symbolic storage systems in the sense intended by Donald, the parallel I mean to draw is nonetheless precise in one respect. Relationships work through persons consciously acknowledging the presence, and/or the intentions, of others as persons capable of action like themselves.

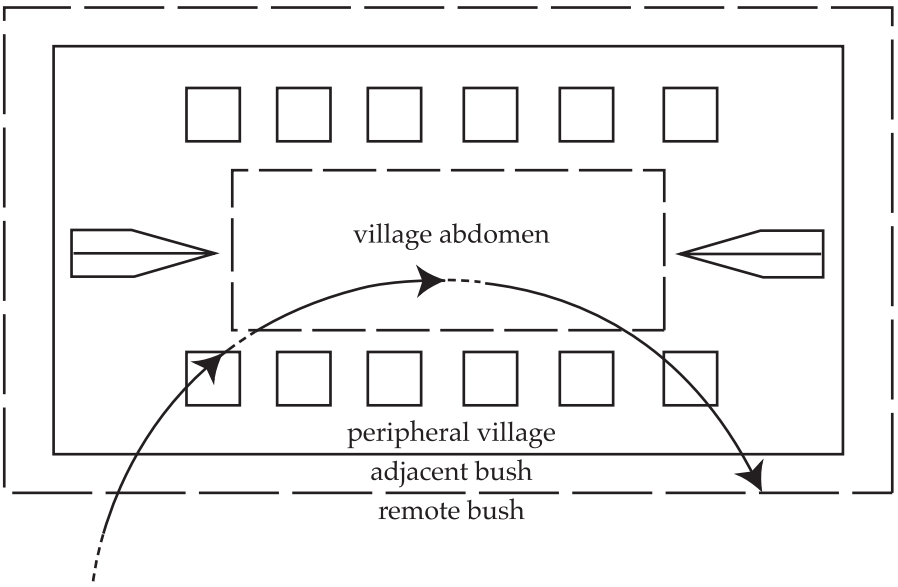


Figure 11.1. *Plan of Mekeo village, Papua New Guinea. (From Mosko 1985, 26, fig. 2.1. with kind permission.)*

This means that all kinds of boundary possibilities arise in which people may put one another at varying degrees of 'otherness' or externality from themselves. Social relationships thus provide an analogue model for the very exteriorizing process that Donald describes, in which memory is externally looped via devices which also stimulate it.

Donald (1991, 309) argues that external memory is not simply coextensive with culture; he wishes to use the term for those mechanisms (artefacts such as literacy) that act as specific analogues to internal memory. He himself deploys an analogue model in his appeal to the difference between biological memory and other memory mechanisms: he represents diverse properties as the difference between what is internal and what is external to the organism. Now that *concept* of difference depends on other differences being held in place, such as that of body and environment. The perception of body boundary in turn requires its own conceptual support — as in the idea of houses having interiors and exteriors, or in images of containment and extension, or in the altered state of whatever is held to cross a line. None of these conceptual supports can be taken for granted. Together they make up the kind of analogical systems by which social anthropologists identify specific cultures. It might be of some interest in the present context, therefore, to explore ways in which the very concept of externality has been (analogically) modelled. I am interested in models that make loops out of an externalizing movement, and that take in other persons in doing so. My examples come from cultures which pay an exaggerated attention to the recursive (e.g. Munn 1986) and elicitory (e.g. Wagner 1986) potential of social relations.

* * *

The eight villages belonging to the Mekeo, who live along the reaches of the Biaru River in the Central province of Papua New Guinea, follow a regular pattern (Fig. 11.1).[1] Clubhouses of the resident clan chiefs are prominent at each end, while domestic dwellings and other structures are erected in parallel rows facing each other. In the centre is an area cleared of permanent features. Coconut and areca palms, planted behind the façade of the houses, do not intrude on this central space.

The village is the focus of human activity — people eat, reproduce and are buried there. However, as the ethnographer (Mosko 1985, 22) adds, the village is not limited to human beings. Domesticated animals, various plants and a whole range of humanly-fashioned artefacts belong there. These village-things are radically separated from those of the bush beyond. Indeed 'village' and 'bush' are conceptualized as distinct domains of activities and powers, and a well-defined croton hedge bounds the periphery of the village. The bush is inhabited by many bush-things, animal, plant and spirit; it is also the source of what Mosko refers to an as astonishing array of natural resources, including garden food and hunting products. What is beyond the village is thus brought into the village for consumption, and wastes are thrown back into the bush. Mekeo draw on a conceptual opposition between 'outside' and 'inside'[2] to encompass both a spatial partitioning of the village and bush and a temporal regulation of the daily cycle of life which takes people between the two (1985, 23). The terms are not organized quite as Euro-Americans[3] might imagine, however: it is the bush that is categorically 'inside' and the village that is categorically 'outside'.

Figure 11.1 is not of course the plan of any specific village; Mosko has abstracted sets of relations that signify differences of various orders, here

rendered in terms of position and space. Now we may ask of the village, first, what kind of information is being stored in the placing of its houses and fences, and, second, what kind of spatio-temporal functions does it allow people to operate upon it. The demarcation between inside and outside, made visible through the croton fence that runs round the village, allows what we might call (after Harris this volume) displaced communication: the ability to imagine oneself either side of it. This can be rendered in terms of seeing different sets of social relations. If the bush beyond the fence is 'inside', this is also the view that people have from the perspective of their overall territory; they are contained within the larger circumference of the land their tribe[4] occupies, and the bush lies within this. A person going from village to bush 'goes inside'. The tribe and its territory does not, however, form an undifferentiated unit. It is composed of villages, each of which contains members of one or more clans, and people interact regularly with other villages of their tribe with whom they are intermarried. From any one person's point of view, then, a tribe contains not only blood kin, but also the affines from whom spouses come, and mother's kin from whom no spouse can be taken. These latter are so to speak 'outside people' (my term)[5] and it is in villages, the places of human habitation, that one encounters such people. To go 'outside' in going into one's own village is thus to include in one's view those with whom one's clan is intermarried, and across more than one generation. In mimetic mode, distinctions are thus sustained, held in place, by other distinctions.

These Mekeo formulations prompt me to consider other material from Melanesian societies showing similar intellectual preoccupations with the relationship between 'inside' and 'outside'. As Thomas (this volume) notes, the very conceptualization of the person is at issue. One has to understand the person in an expanded sense: there are necessarily many people involved.

Inside and outside

The idea that it is social relations which separate out aspects of persons and present them with worlds beyond themselves has many antecedents in anthropological accounts. This was Fortes' interest in the West African Ashanti stool, and the concept of office it created.[6] Regalia that embodied the virtues and powers of a particular office, in this case politico-religious positions of authority, came in turn to bestow virtue and powers on the person of the office-holder. The artefact thus both absorbed the person, and outlived any one incumbent in its own durability. What was being displayed to the rest of the world was the transformed status of the incumbent, a visible reminder in material form of the immaterial counterpart in the rules that the office-holder also observed in his person. In such circumstances, the artefact was created as 'external' to the person precisely insofar as it embodied extra-personal power. That social separation of the incumbent from the office provided the conceptual basis for imagining a source of authority beyond the individual person. The same principle may hold elsewhere, as in the more diffuse system of the Tallensi of Northern Ghana (to keep with Fortes' material), where the power of senior men was seen to emanate from their status within a domain of social life held separate from domestic affairs. From the perspective of the domestic domain, in turn, activities were understood as both belonging to it and lying beyond.

While in many contexts Melanesian people conceptualise a removed realm of power (a spirit or ancestral world), a preoccupation with what is internal and what is external seems to govern the perception of all kinds of relations. Distinctions between two features may be held in place by other distinctions between other features; they may also be held in place by movement 'across' the boundary between features, or by shifts in perspective which substitute the view from one side by the view from the other. Such movement and shifts may well be anticipated in both terminology and imagery. Let me start with the example of a clan group.

Think of the rule of exogamy, the stipulation that one should marry outside a particular group, such as a clan. Exogamy simultaneously defines sets of people as insiders (those who cannot marry one another) and as outsiders (those from whom spouses come). Taking up the vantage point of one's clan group makes this clear. But note the consequence of this particular example, and it is not fortuitous; the positions fold back on themselves. If members of other clans are outsiders from *the point of view of marrying* spouses from them, then these spouses are also brought within the clan through those marriages. That movement of persons 'between' clans and thus 'across' clan boundaries helps sustain (make durable) the initial distinction. I take a cue from the recent history of the area of I know best, Mt Hagen in the Papua New Guinea Highlands.[7] A woman would be separated from her own clan through the exchange of bridewealth gifts between the intermarrying patrilineal clans, components of which were

equated with mortuary payments. Thus a woman was referred to as being 'severed' from her clan of origin in order to 'go inside' (as they said) the husband's clan. Meanwhile her brother would be taking a wife from an outside clan and through her outside powers be producing further members for his own. If pressed to the point, Hagen people would probably have said that it was only by bringing in external sources of fertility that a clan could reproduce at all. That external source was kept external. Although a woman went inside her husband's clan, she did not lose her connections with her own kin; far from it, she became a 'road' between them, her outside origins being conserved in her natal clan name which she kept. Rather than being fully absorbed by the new clan body, it enclosed or encased her, like a foreign body. Hagen men sometimes referred to their wives as being inside a fence, as though one could imagine a small enclosure within the clan territory contained within the wider circumference of the clan land, an image also summoned by gardens which were individually fenced within a clan territory.

There are other images for this enclosing movement. Across Melanesia, one can generalize, the alimentary and procreative functions of the human body chart the process of substances seen now as inside and now as outside. These comprise a reproductive model of life, one which draws readily on metaphors of feeding and evacuation, of sexual union and childbirth. There is thus an interplay between notions of externality and internality imagined as body processes within a single organism, as one might have an idea of a fetus within the mother's enclosing body, and the conjunction of distinct bodies in cross-sex intercourse. Union, however, would be a bad translation, at least in the Hagen case, for (by contrast with Euro-American idiom) conjugal partners are not joined together as one person — rather each conserves their distinct social identity. Indeed, each party elicits from the other behaviour appropriate both to their sex and to their social origin. Thus it is because the husband is socially distinct from his wife that the child she carries is socially distinct from her (in this patrilineal system, women carry children for the husband's clan). If this were Mekeo one might say that the husband plants an 'inside' seed within her 'outside' body.

The flow of body substance between persons is also a process of extraction or elicitation. What the woman takes within her she later brings forth as the newborn child. Now while one might raise one's eyebrows at this platitude, one might lower them again on thinking about the way in which Hagen people incorporate this into their thinking. We should understand these different body states as having their counterpart in social divisions marked by marriage rules and food taboos. Transfers of body substance through such rules and conventions in turn have a counterpart in various artefacts (such as bridewealth valuables)[8] that also flow between people (*cf.* Wagner 1977). Bodily flows are both made visible in the transfer of material items 'between' people and 'across' boundaries, and make the transmission of energy and life an analogy for those transfers themselves. This counterpart movement of artefacts is locked into body process in a second mode. The items to which I refer have value because they are regarded as being extracted from persons, just as persons (like the bride) are regarded as extracted *from other persons*. In fact the two modes interpenetrate precisely at the point of marriage. In arrangements of the Hagen kind,[9] it was these material artefacts that *elicited* persons. One clan yields its daughters (in marriage) to another because that other clan had offered artefacts (bridewealth) in the form of valuables for her. Each elicitation was in fact an instance of the elicitory potential of relationships.

The same elicitory potential was played out in the long-term reciprocal exchanges of wealth between political units (such as clans) for which men in the central Highland of Papua New Guinea were once renowned in the ethnographic literature. And what was this ceremonial exchange but the extraction of items of value from one group — pigs, formerly shell valuables, more recently money — by another who in turn took them 'in' order to give them 'out' again? People's constant recourse to body imagery supposed wealth as always within someone's body: it was only taken from one to be lodged in another. In Hagen, the recipient clan literally took the valuables inside its men's house and pigs inside its territory. This passage from 'outside' to 'inside' was further sustained by the distinction between the visible and invisible. What momentarily appeared also disappeared again. Items thus oscillated between the condition of being internal and being external to the body of one's own clan.

Concealment and revelation

This oscillation is interesting if only because of the explicitness of the accompanying social practices. Persons could be oriented outwards or inwards, even as parties to the exchanges alternated in their positions vis-à-vis one another. The men of two clans engaged in exchange alternated from being the

recipients to the being the donors of wealth; indeed we may say that they were exchanging perspectives on each other (Strathern 1988, 230). And the possibility was anticipated in the relationship between them. A donor was a future recipient, and *vice versa*. An exchange relationship thereby objectified that conceptual move, that recursive ability to see oneself from the view of another, through moving items (artefacts) between persons. These artefacts thereby moved the places persons occupied.

This was not a logic that the anthropologist had to excavate. People acted openly by it. On an occasion of a public gift, the ceremonial ground would be thronged with those who had come to see what the recipient was getting, among them those who would be in turn potential recipients of such wealth as he passed on. At the same time the present donors, imagining themselves as future recipients, and challenging the present recipient to give back at least an equivalent amount, did not just draw attention to the size of their present gift — it anticipated their own future ability to raise as much again later. The whole matter might be about the politics of clan composition and the economics of wealth creation; it was also about reproduction, ensuring the capacity to be productive and revealing that capacity through its effects.

Now such claims could not be made in isolation; one could not so to speak reproduce by oneself. Donors depended crucially on recipients receiving their gifts, and for taking them inside, for how else was the donors' creativity to be revealed? This was a prestige system where those who claim prestige depended on others to recognize it. Similarly, the producers of wealth would only be able to produce *again*, in the future, if those to whom they were giving the wealth were prepared to accept the immediate gift. In other words, donors required willing containers in which to pour the results of their prowess. We may think of these as an audience, or a body of consumers for products, with the proviso that the transactions were locked into a social alternation so that those who were producers at one point became consumers of equivalent items at another.

The social alternation was explicit: the categorical division into donors and recipients created the possibility of future creativity. It was imagined in terms of different bodily orientations. First, I noted that a clan receiving wealth took the wealth into itself when it took the wealth into its men's houses. (The analogy between houses and persons, mediated through the concept of a body,[10] is elaborated throughout Papua New Guinea.[11]) Like their ornaments that Hageners wrapped up in dark packages — dark because of the soot that caked the interior of houses — shells were secreted away by the recipients of an exchange gift, and money even more easily. Pigs were dispersed to different households. Men removed their dancing attire, redistributing it among those from whom it was borrowed. Walk into a place a few days after a display and you would see nothing — a shabby man in ragged clothes which only tell you, if you did not know by other means, that you have no idea of the wealth he received. All visible evidence would have vanished, the artefacts given away to others or wrapped up and stored inside the house, a process which in the case of shells was thought to make them grow, until the next occasion on which people brought them outside. Everything was then turned inside out. So, second, in

Figure 11.2. *Shells laid out down a ceremonial stand, streaming away from a house [where the viewer is standing]. Mt Hagen, 1964. (Photograph by author.)*

standard Hagen iconography, wealth would stream from the now open men's house (Fig. 11.2). Dancers turned themselves inside out too — on the exterior of their bodies they wore all the ornaments that signified their inner state of well-being — and took omens to reassure themselves that the interior would yield its fruits. Men anxiously poured glistening oil from dull, smoky flasks, waiting for the liquid to flow as evidence of their ability to bring internal capacities forth. Wives whom the male donors kept 'enclosed', the fertile centres of their clans, they turned inside out too. When women danced, they were decorated by their kinsmen, and covered in the red paint that indicated among other things the interiority of wealth, now everted, turned outside for all to see.

The important point to retain here is what these people retained. That inner state was not brought outside, revealed once and for all, so that people could forever see inside, as one might imagine Euro-American knowledge systems where what is brought outside remains (more or less) permanently in view. Rather, what you saw on the outside was an everted *inside*:[12] an interior state turned momentarily outside, subsequently to be folded back and concealed from view. So it remained an 'inside' being brought out, the externalizing effect a momentary one.

All this was apparent in the form of the pearlshell, a valuable which became for a time the most potent symbol of economic exchange, political power and generative reproduction Hagen men possessed. The shell, enclosed in its resin surround, painted with ochre, was occasionally likened to a fetus within a womb. Connolly & Anderson (1987, 251) reproduce a photograph from the 1930s, in the days when pearlshells first entered the Highlands in number, in which men shoulder dozens of shells in special netbags, not unlike the carrying bags of women (the same term is used of womb). These were bags in which women put the products of their creativity — food for pigs and food for their families — containing thereby what would shortly come outside for others to consume (Fig. 11.3).

Incorporation and inscription

Whether we address the person or the body, we might want to ask just what is inside and what is outside. Or perhaps one should be asking what the personification of artefacts (the house as a body, the shell as a fetus) does to the idea of things being external at all. In what sense are items external if they are also caught up in the network of relations which bind people to one another? If the shell you have is mine because you owe it to me, in whose body does it reside, and in what sense is it external to either of us?

Figure 11.3. *Carrying bags. A girl returns from the gardens with sweet potatoes in one netbag and vines and leaves in the other. Mt Hagen, 1964. (Photograph by author.)*

Such 'Hagen' questions, and the analogies they presuppose, recall Thomas' (this volume) reference to Connerton's (1989) arguments on memory. On the face of it, Connerton's contrast between 'inscribing' and 'incorporating' practices resonates with that between the external storage of information as opposed to an internal one. Inscribing practice he sees as exemplified in devices for storing and retrieving communications — he mentions encyclopaedias, tapes, computers — that all have the characteristic of literacy itself; it 'traps and holds information, long after the human organism has stopped

performing' (1989, 73).[13] Incorporating practices, on the other hand, are gestures that require the presence of bodies to perform them. Protocols of posture or habits of eating may convey information, but cannot be done outside the context of the performance. This does not mean to say that they have no lasting effect. On the contrary, his thesis is that even in societies whose practices are dominated by inscribing techniques we find a continuity of bodily habit, information transmitted from one person to another over time. The social dynamic with which he is concerned, then, is transmission and the duration of memory, so that ancient practices are projected into the future not just through the records that people leave behind but through their bodily routines. Thus memory may be passed on in non-textual and (he adds) non-cognitive ways (1989, 102–3). Now this is the point at which Connerton both praises anthropology for attending to performance and castigates anthropology for being interested in the momentary communications of the present rather than seeing the performative potential for the storage of memory of past practices, and thus of information about them.

In attending to the present, the anthropologist is of course attending to the pasts and futures that people encapsulate (in the present) for themselves. We might say that the performance of ceremonial exchange, or bridewealth, is at once an incorporating practice, replete with gestures carried out by human bodies/persons, including communication through the artefacts they transfer from one to another, and an inscribing practice, insofar as persons/bodies hold information about previous states of affairs that they can indicate without re-enacting. Previous roles that people occupied, as we might say a recipient was once a donor, or the anticipation of an outcome, as one might say that a clan in handing over a young girl is also handing over a mother with the potential to have a child, comprise information held over from other times and places. It comes from previous performances when the actors occupied different positions, or from the projection of absent people's performances onto those present. So what the present body enacts is less an incorporating repetition of a former state of affairs than a transformation of them, a mimesis that works through inverting or everting a previous position.

Instead of imagining persons/bodies ('minds') as embedded in a 'culture', Melanesians (not just Hageners) imagine them as embedded in other persons/bodies. As artefacts for one another, they are processing entities of a sort. The social dynamic is not that of personal memory holding everything one needs to know, to be used when the occasion arises in order to repeat past experiences or summon former knowledge. Rather, the social dynamic is that of persons in relationships where one body elicits things from another, and where one body can only bring forth in the presence of the other. A mutual history is contained 'between' them. It allows, at least in the exaggerated form presupposed by exchange relationships, that each person can anticipate being in the position of the other. As we have seen, this is an interdependence which requires that persons do not merge but remain (socially) external to one another. Here the idea of externality sustains the possibility of relationship as such. Let me produce my own mimesis. What do we substitute for 'culture'? Rather than saying that already existing things are incised with cultural value (inscription), or that the body takes culture within itself in its habits and postures (incorporation), we may say that persons create effects as at once external and internal to themselves. That becomes evident when it is their relationships which they wish to reproduce. People do not have to re-enact specific events when past events are subsumed under (objectified in) relationships. But they do, so to speak, have to re-enact the relationships themselves.

Reiteration

In his exploration of *Technologies of Choice*, Lemonnier (1993a,b, 22) remarks on the puzzle of technical invention. The issue he has in mind is how is it that people perceive a sufficient gap in what they have to hand to want to plug it. If a system works, how can that conceptual gap arise? How can one conceive of something one does not have? His interest then becomes why some technical practices get chosen over others. One answer is already contained in Latour's contribution to Lemonnier's volume: this is a false model of the relationship of language to other cognitive processes, even as questions about cultural elaboration are a false model of the relationship of (useful) artefact to (ornamental) object (1993, 378). If Euro-Americans tend to see the pig first as an animal (one of his examples) and then as an item of cultural value, they arrive at inscription as the archetypal 'cultural' activity. Latour develops his counter-model of quasi-objects as technique and sociality enfolded inseparably together.[14] The anthropologist should be no less adept than his or her informants at taking on other perspectives. If we were to start with the Hagen view, we might well wish to ask about quasi-persons: persons have relationships enfolded within their bodies,[15] simultaneously external and internal

to themselves. Now if Lemonnier's question were also about information (if people are already in communication, why should they wish to add anything?), would this also contribute to an answer?

It is no new observation to say that information may be produced as a by-product of other activities (see the discussion on language in Goody 1995). This may be true even when inducing states of knowledge seems part of the actors' intentions. Observers of initiation rituals from Richards (1956) onwards have noted that boys and girls are 'taught' what they already appear to know; there seems no fresh information as such to be gained Take the Wahpeton Dakota village (Spector 1993) and the archaeologist's reconstruction of a girls' first menses: a girl who already knew how to quill was submitted to four intensive days of nothing but quilling in order to make her 'good with the awl' (1993, 38). Spector interprets this celebration of the girl's future domain of accomplishment (the future woman would have her achievements at robe or tent making inscribed on the flaps of the Council tipi (1993, 37)) in terms of the significance accorded the artefact, the awl. We may add that it is also the instilling of a bodily routine. Far from information being imparted into her, it seems that the four days instead demonstrated the capacities that could be drawn from her. But why did it have to be reiterated?

Figure 11.4. *Tally made of bamboo slats, recording exchange transactions, worn here by someone decorated for an accompanying dance. Mt Hagen, 1967. (Photograph by author.)*

D'Errico (this volume) refers to the significance of the accumulation of notches on bone and other artefacts. He argues that carving a new notch on a tally stick without altering the previous record deploys a temporal but not necessarily a spatial or morphological code, though these are found in combination in other contexts. If we attend to the social *activity* of Dakota notching, we may learn something further again.

Someone who has spent hours boring holes in hide then makes a single, though unpierced, hollow in the bone handle of the tool with which she is making those holes. Perhaps the one notch stands for the completed artefact; but perhaps the action of making the notch also stands for the countless hand movements and uses of the tool with which she brought other artefacts to completion. (Note that the tool has so to speak changed position: it has become the recipient of the boring process rather the instrument of it.) Of course the Dakota used quite different tallies as well (e.g. sticks), just as Hagen men in the past used tallies for the number of 'hands' of shells they had given to others.[16] Indeed, as Spector surmises, we might wonder if the tool was not also an ornament, an extension of the body also receiving an impression upon it. (She uses the term 'inscribe' to describe the impression that finding the awl made on her own mind (1993, 34) and she no doubt wishes to bring to mind the inscribed impressions on the awl handle itself.)

The Hagen tally, demonstrating the prowess in disseminating the wealth the (male) wearer had attracted, was made to be worn on the chest (Fig. 11.4). When it came to a ceremonial occasion, a man might either wear his own tally or else give it to a brother or son to wear, or even divide it up: there was no confusion over information created by such actions, for no-one would reckon the status of a man by his tally alone. People were openly agnostic in Hagen, as elsewhere in Melanesia, about what could be inferred from external markers; one never knew what revelations also concealed. But apart from that, reputation depended on the configurations of the present, and past exploits were only a partial pointer to it; in

any case, to distribute his signs of achievement among close kin was apt for a man who depended on support for success. Exploits could not, then, simply be 'added' to exploits. Rather, each giving away of shells indicated the tremendous effort acquired *afresh* on each occasion to assemble and distribute, as each pushing of the awl through the hide required new effort. The exchange tally was a sign of the repeatedly summoned energy by which the wearer brought off yet again a grand gift. In other words, the number of occasions made a long tally awesome precisely as evidence of someone able again and again to draw out of himself the capacity to dispense wealth, a kind of insistent rehearsal of activity or energy, as though iterative endeavour had a virtue of its own.

In this mimetic re-presentation of past actions, people represent the very ability to act, and that in turn may have 'informational' content of a kind. What has to be learnt afresh is that it is only by (fresh) social action that the conceptual universe is kept in place. In the oral and politically uncentralized regimes of the kind I have been describing in this chapter, where persons deploy others as signs for their own states of being, orienting themselves to artefacts like themselves, constant repositioning becomes both condition and outcome.[17] It takes effort to keep social distinctions in motion. In communicating information about the results of those efforts, people stimulate themselves to further effort. As a consequence, positions are made anew. We might say that social mimesis thus creates the possibility of 'information' as new knowledge. Certainly, it is overt cultural dogma in a place such as Hagen that relationships will wither away unless they are kept in a state of activation.

Movement

I have been drawing on the exaggerated attention that certain modern peoples pay to the recursive and elicitory character of social relationships. Their models are suggestive about what both mimesis and analogy can entail in human interactions.

Whereas a fence can keep the distinction between inside and outside precisely because it is built in one place, for that is all it does, when persons becomes signs for what is internal and external to themselves, movement may be required to keep the very distinction in place. Persons present themselves to others in terms of what they have closed off or, on the contrary, what they can draw out of themselves. This is communicated by movement through time and space, so that the body appears in varying states of openness and closure (to itself and to others).[18] But if different times (such as times of the day or points in an exchange cycle) and space (such as the centre or periphery of a village or ceremonial ground) provide measures for different social states, then it means that persons are also perceived as constantly liable to differentiation — when they act and where they move takes on a signification to which they have to respond. As if to emphasize that there is no escape from having to respond, the Melanesians I have been describing here find a further analogue in the body's mode of processing materials, the un-avoidable relationship between ingesting and egesting. This iteration is not mere repetition.[19] The body is held in a state of animation through what it takes in and gives out. The ability to repeat actions in other registers, to conceptualize concepts in this sense, in turn enacts the replenishment of energy.[20] I repeat the point that renewal of energy or capacity is not confined to the repetition of the same tasks (replication) but can be equally well effected in the ability to transform one task, or relationship, into another (reproduction). Mekeo underline that point for us.

Let us look at the plan again (Fig. 11.1). The conceptual alignments and separations impose a bodily regimen on the occupants; indeed the village is itself a kind of body. I said that there were constant transfers of produce from the bush into the village, and return of refuse to the bush. This is not an undirected coming and going but a flow of substance conceptualized as though it were coursing through the human frame.

Observe the empty space in the centre, used for feasting and occasions when guests are taken into the village. Mekeo do not conceive of this as the centre of a centre or as the inmost part of the inside. On the contrary, they cannot do so because we know that the village as such is already an 'outside' place in relation to the surrounding bush. But the same relationship between bush and village is repeated in the relationship of the periphery of the village where the houses are and the empty plaza in the centre: the centre is an inside of a kind. Given that the village as a whole is an 'outside' place, it is the outside's inside, and Mosko uses the phrase 'inverted outside'. Similarly in relation to the inside bush: the bush immediately adjacent to the village is distinguished from the more remote bush as a kind of everted region, an 'everted inside'. The English language phrasing is awkward; the conceptual space as it is lived by the Mekeo can be simply re-rendered as movement.

Every day follows a similar course. Food is brought from the remote bush to the village, not

to the centre but to the peripheral dwelling houses where in the evening it is cooked and eaten. This bringing of food into the village is complemented by a scrupulously observed regimen of waste disposal. A rule specifies the place of excretion. Early morning each villager makes his or her way to the bush, not the remote bush but the peripheral bush just over the fence, to empty their abdomens. When they return they clean up the village, sweeping all the refuse and leavings into the central plaza. The rubbish is piled up in the centre, before being carried to the edge of the village and dumped where human beings have also evacuated. The abdomen of the village is thus cleaned out too. Indeed the central plaza is called just this: 'village abdomen'.

Now the village centre or body cavity is not in any simple sense an internal place. If, in the English senses of inside and outside, you think of the alimentary tract through the body as taking in food from the outside and returning it to the outside, one could think of those inner chambers as exposed to the outside world, as though it were the person's outside within. In Mekeo terms, the waste that collects in the abdominal cavity is already outside the person, as though it had been already swept there, and must be taken from this 'outside' to 'inside' the bush: 'the abdomen of a human being is homologously conceived as inside the body only insofar as it is an inversion of space outside the body' (Mosko 1985, 27). The abdomen is thus simultaneously an inside and an outside place, as the village abdomen makes evident. As we have seen, Mekeo always sweep refuse here before removing the stuff to dump over the fence. So rubbish is swept 'into' an area thereby demarcated off from the rest of the village, while as part of the village it otherwise remains an 'outside' place. Waste is separated from produce within the village, even as the source of produce in the (remote) bush is separated from the place (adjacent bush) where waste is deposited. 'By virtue of the daily transfers of objects between village and bush,' writes Mosko (1985, 25), 'outside and inside domains are bisected by a reversal or inversion of each, such that the outside village has its own inside place (i.e. an inverted outside) and the inside bush has its own outside (i.e. an everted inside).' In sum, the village abdomen is an inversion of an 'outside' (village) space, while the area over the fence is correspondingly an eversion of an 'inside' (bush) space. Food and materials collected from the bush and gardens and processed within the village thus travel in human eyes from inside to outside and then, in finally being evacuated, from an inverted outside to an everted inside.

Needless to say, this daily routine is only the beginning of the conceptual operations Mekeo perform on their own thoughts. For instance, the whole system is bisected by what appears above ground and what appears below ground, and there are various rules about what holes can be dug in the ground where, including rules about the burial of bodies. The plan is also in effect a multidimensional grid that directs not just the daily activity of food and waste production but the conduct of ceremony (in feasts and mortuary rites and so forth), the manipulation of supernatural powers, and the relationship of persons to one another. Indeed, one may argue it is a presentation of a basic conceptual schema that relies crucially on the recursive operation of relations on relations. The iterated behavioural routine of persons moving between bush and village, in the collection of resources and disposal of waste, recalls whole sets of analogies.

A regular recapitulation, then, of the movement of items between village and bush is given long-term spatial presence in the permanent layout of Mekeo houses and plaza. Hagen people enact similar movement in a quite different temporal trajectory. In dwelling on a particularly public set of practices (ceremonial exchange), I have suggested that behind the change of perspectives entailed by the simple alternation of donors and recipients in relation to each other lies a social dynamic of elicitation: a world in which capacity is predicated on the ability of persons to draw that very capacity out of one another. What lies within is potentially external precisely because it can be taken inside by someone socially external to oneself. In men's reciprocal exchange, the external other actually takes one's externalized inside into his own inside. The artefacts that flow between them carry this movement: whether they flow towards one or away from one will indicate the current social axis of the relationship. In Hagen the movement itself takes place over a span of years.[21] However, the long-term temporal sequencing between the occasions on which donors and recipients switch places is re-enacted spatially in the brief display on the ceremonial ground. The re-enactment is to great visual effect, for the handing over is ordinarily staged in front of the house that has both taken in and gives forth valuables.

* * *

There is a final observation to extract from the way in which certain Melanesian peoples combine various analogies to communicate the actors' effects or influ-

ence on one another. And that is that they furnish themselves with a calculus for those effects; this is how one could describe the tally of shell gifts worn in the past by Hagen men. There is a corollary to this observation. An analogic calculus will require constant social work to keep its measuring capacity in place. Each distinction requires more distinctions to sustain it.

Men from the Trobriand Islands at present living in the capital, Port Moresby, make displays of their urban harvest in imitation of the harvest competitions people hold at home; Battaglia (1995) describes one such event that took place in 1985. They built, as people do at home, mounds of yams in the shape of a cone. The cone has to be composed in one go, a manoeuvre which requires a fine judgement of dimensions and in particular of the size of the base to start with.[22] The builder must project the correct dimensions for the base from the number, sizes and shapes of yams, to make a stable and well-shaped stack from them. The whole display would be a test of the gardener's capacity to turn his effort to effect in its impact on others.[23] This effect requires a temporal division into past and present, the past being brought into the present as something formerly hidden and now revealed. By virtue of having happened already, the completed activity being celebrated is thus categorized as off-stage (hidden), and what happens off-stage is growth (*cf.* Biersack 1982). But once the growing is complete and the yams ready for collecting, the transformed labour and soil become a visible aesthetic object of people's relations with one another. The two states (concealment and revelation) are thus kept distinct from one another through accompanying distinctions of past/present, growth/cessation of growth, and so forth. On this occasion, however, Battaglia was made aware of a problem for the city dwellers. Unable to make these cones of yams next to their gardens, and having to transport the yams in pickup trucks across the city — instead of being immediately amassed as they emerged from the ground they were individually wrapped to prevent damage in transit — gardeners fell under suspicion for surreptitiously adding tubers from other sources. They were thought to be secretly combining their own with other people's. As a result, 'displays were growing at a time when growth ought to have ceased' (Battaglia 1995, 85). The distinction between growth and display could not be held stable by all the other temporal and spatial markers — and, accordingly, raised questions about how to measure the accomplishments being claimed.

Notes

1. The so-called 'Bush Mekeo'; I draw principally on Mark Mosko's (1985) original ethnography referring to the 1970s.
2. Double quotation marks indicate vernacular phrases.
3. A term for a discourse derived largely from twentieth-century North American and Northern European cultures to which the language of analysis (such as the one in which this chapter is written) belongs.
4. Mekeo were composed of two mutually hostile political units ('tribes'), at war with one another; each of the tribes was endogamous. Population figures were tiny (583 and 1258 respectively in 1970) (Mosko 1985, 15). While I follow Mosko's account closely in many places, the observations on perspective are mine.
5. I simplify an interlocking set of analogies. The relationship of one's own clan to one's spouse's clan, or of blood kin to non-blood kin, is analogous to that of inside to outside, while the relationship between the clans of one's mother and spouse's mother is analogous to that between inverted outside and everted inside (see below) (e.g. 1985, 144). The range over which these analogues are repeated forms the subject of Mosko's book.
6. *Kinship and the Social Order* (1969) brings this and the next example together.
7. The material will be familiar to many readers. Relevant to the present account are A. Strathern 1971; A. & M. Strathern 1971; M. Strathern 1979; 1987; 1988. I refer to events as they were first recorded in the 1960s and 1970s, when the combined population of two related dialect areas was some 80,000.
8. One may think of 'artefacts' as material items such as valuables flowing *against* the flow of persons, as in compensation payments for bodily injury or loss. But we may compress the analogy (between flows of persons/artefacts) and also think of the one in terms of the other, e.g. persons *as* artefacts.
9. Not universal in Papua New Guinea by any means. Some of the controversy is adumbrated in Godelier & Strathern 1991. Readers will have inferred that I am describing arrangements in which men have more stake than women.
10. For a recent general statement, see Carsten & Hugh-Jones 1995.
11. Most notably the Sepik river region where much play is made (for instance) of boy initiates entering houses that are simultaneously male and female in structure, and emerging forth in altered state. Gender distinctions comprise another set of conceptual supports.
12. I anticipate/borrow Mosko's terminology here, although the Hagen configuration is by no means directly mappable onto that of Mekeo.
13. E.g. 'By substituting a visual record for an acoustic one, the alphabet frees a society from the constraints of a rhythmic mnemonics' (1989, 76).
14. He has a wonderful passage (1993, 380) about the insouciance with which we identify 'more [a higher

level of] society' with 'more technology'. (Euro-American definition of human society becomes the more certain the more we can identity the enlistment of non-humans — tools, artefacts, plants — in people's interactions.)

15. On quasi-persons see Wagner 1991.
16. As in the case of a Dakota notch for each set of 10 hides, or tent, which a woman worked, so each small Hagen slat of bamboo recorded a set of 8 (or 10, a superior 8) shells given.
17. Melanesianists will recognize an allusion here to analogic kinship (Wagner 1977; Gillison 1993). The most salient distinctions have to be the most actively sustained.
18. Mekeo have developed this to a fine art (see Mosko 1983; 1991).
19. But then nor is repetition (Deleuze 1994). Cf. Donald's (1993, 13) comment that human beings in effect start from a new base line with each generation.
20. The Melanesian material describes a world where people do not just reflect on their activities but are reflexive about them, able to switch perspective, to anticipate outcomes and see the past as versions or transpositions of the present. The recall cues (cf. Mithen this volume) include the changing social positions that people take on one another.
21. Though the Hagen movement is in turn foreshortened, speeded up one might say, by contrast with cycles that unfold over generations, as is true for instance of Etoro (cf. Kelly 1993).
22. It is the size of the base which is measured (by a piece of string) in the competition between gardeners. Being able to complete the building in one go is a mark of aesthetic power also demonstrated in the carving of canoe prows.
23. Size and quantity are significant dimensions. 'Yams . . . as much grow their subjects [the gardener] as the other way round. Gardeners trade on their ability to embody supplementation, incorporating others in exchanges that expand their own political parameters' (Battaglia 1995, 80).

Marilyn Strathern
Department of Social Anthropology
University of Cambridge
Cambridge
CB2 3RF

References

Battaglia, D., 1995. On practical nostalgia: self-prospecting among urban Trobrianders, in *Rhetorics of Self-Making*, ed. D. Battaglia. Berkeley (CA): University of California Press, 77–96.

Biersack, A., 1982. Ginger gardens for the ginger woman: rites and passages in a Melanesian society. *Man* 17, 239–58.

Carsten, J. & S. Hugh-Jones (eds.), 1995. *About the House: Lévi-Strauss and Beyond*. Cambridge: Cambridge University Press.

Connerton, P., 1989. *How Societies Remember*. Cambridge: Cambridge University Press.

Connolly, B. & R. Anderson, 1987. *First Contact: New Guinea's Highlanders Encounter the Outside World*. Harmondsworth: Viking Penguin.

Deleuze, G., 1994 [1968]. *Difference and Repetition*, trans. P. Patton. London: The Athlone Press.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Donald, M., 1993. Hominid enculturation and cognitive evolution. *Archaeological Review from Cambridge* 12, 5–24.

Fortes, M., 1969. *Kinship and the Social Order: the Legacy of Lewis Henry Morgan*. Chicago (IL): Chicago University Press.

Gillison, G., 1993. *Between Culture and Fantasy: a New Guinea Highlands Mythology*. Chicago (IL): Chicago University Press.

Godelier, M. & M. Strathern (eds.), 1991. *Big Men and Great Men: Personifications of Power in Melanesia*. Cambridge: Cambridge University Press.

Goody, E.N. (ed.), 1995. *Social Intelligence and Interaction: Expressions and Implications of the Social Bias in Human Intelligence*. Cambridge: Cambridge University Press.

Kelly, R., 1993. *Constructing Inequality: the Fabrication of a Hierarchy of Virtue Among the Etoro*. Ann Arbor (MI): University of Michigan Press.

Latour, B., 1993. The ethnography of a 'high-tech' case, in Lemonnier (ed.), 372–98.

Lemonnier, P., 1993a. Pigs as ordinary wealth: technical logic, exchange and leadership in New Guinea, in Lemonnier (ed.), 126–56.

Lemonnier, P. (ed.), 1993b. *Technological Choices: Transformation in Material Cultures Since the Neolithic*. London: Routledge.

Mosko, M., 1983. Conception, de-conception and social structure in Bush Mekeo culture, in *Concepts of Conception*, ed. D. Jorgensen. *Mankind* special issue 14, 24–32.

Mosko, M., 1985. *Quadripartite Structures: Categories, Relations and Homologies in Bush Mekeo Culture*. Cambridge: Cambridge University Press.

Mosko, M., 1991. Great men and total systems: North Mekeo hereditary authority and social reproduction, in Godelier & Strathern (eds.), 97–114.

Munn, N., 1986. *The Fame of Gawa: a Symbolic Study of Value Transformation in a Massim Society*. Cambridge: Cambridge University Press.

Richards, A., 1956. *Chisungu: a Girl's Puberty Ceremony*. London: Faber.

Spector, J., 1993. *What This Awl Means: Feminist Archeology at a Wahpeton Dakota Village*. St Paul: Minnesota Historical Society Press.

Strathern, A., 1971. *The Rope of Moka: Big Men and Ceremonial Exchange in Mt Hagen, New Guinea*. Cambridge:

Cambridge University Press.
Strathern, M., 1979. The self in self-decoration. *Oceania* 49, 241–57.
Strathern, M., 1987. Producing difference: connections and disconnections in two New Guinea Highland kinship systems, in *Gender and Kinship: Essays Towards a Unified Analysis*, eds. J.F. Collier & S. Yanagisako. Stanford (CA): Stanford University Press, 271–300.
Strathern, M., 1988. *The Gender of the Gift: Problems with Women and Problems with Society in Melanesia.* Berkeley (CA): California University Press.
Strathern, A. & M. Strathern, 1971. *Self-decoration in Mount Hagen*. London: Duckworth.
Wagner, R., 1977. Analogic kinship: a Daribi example. *American Ethnologies* 4, 623–42.
Wagner, R., 1986. *Asiwinarong: Ethos, Image, and Social Power Among the Usen Barok of New Ireland*. Princeton (NJ): Princeton University Press.
Wagner, R., 1991. The fractal person, in Godelier & Strathern (eds.), 159–73.

Chapter 12

Some Problems with the Notion of External Symbolic Storage, and the Case of Neolithic Material Culture in Britain

Julian Thomas

This chapter offers a critical review of the notion of external symbolic storage from the point of view of contemporary philosophy. It is argued that the concept of external memory representation relies upon the Cartesian division between the mental and the material, and present human knowledge as being composed of atomized bits of information which are gathered from the environment before being 'downloaded'. In contrast, I present a view of thinking and signification as engaged, worldly, and relational. In these terms the epochal changes in material culture which characterized the beginning of the Neolithic period in Britain can be understood as a 'technology of meaning' which enabled meaningful worlds to be created through social performance.

In addressing the notion of external symbolic storage, the present volume encourages us to consider the role of material culture in signification and memory. From an archaeological point of view, this can only be a positive direction to follow. However, the issue also opens up a large area of disagreement between cognitive psychology and some forms of contemporary philosophy. In this contribution, I should like to draw attention to this disagreement, because it arguably has fundamental consequences for the way in which archaeologists conceive of material culture. Put simply, my concern is that the concept of external symbolic storage derives from a framework which constructs 'the cognitive' as a sphere of development which is separate from, and in some senses anterior to, the material world and the social. In asserting that what makes us *human* emerges in the interior space of the mind, and is only later turned outward to encompass material things, it relegates material culture to the status of a product or repository of mental activity. In an interesting way, this echoes the culture-historical archaeology of the mid-twentieth century, which was roundly criticized by Lewis Binford (1965; 1972) for locating the source of cultural dynamics within a sphere of internalized cognitive norms. Both of these approaches see the main thrust of human development taking place within the mind, and consequently render material things in the external world as pallid reflections of processes which happen elsewhere. In Binford's terms, the disadvantage of such a perspective is that (short of indulging in some form of 'palaeopsychology', getting inside the minds of long-dead people) it places cultural dynamics beyond the range of archaeological analysis, and reduces the study of material culture to a descriptive exercise.

This demotion of archaeology to the investigation of the outcomes of psychological events is worrying enough in itself. But it is perhaps a more significant charge that much of cognitive psychology is implicated in a modernist humanism which continues to obscure the character of materiality. I will argue that forms of modernist thought which first became a coherent system in the work of René Descartes tend to be implicit in cognitivist accounts of human history. For this reason, I will suggest that the notion of symbolic storage actually does damage to our appreciation of material things. This paper

will propose an alternative understanding of the material world, and briefly outline its archaeological implications in the context of the material culture of Neolithic Britain.

Minds and things

As a number of contributors to this volume indicate, Merlin Donald's book *Origins of the Modern Mind* (1991) introduces the theme of external memory within a broader theory of human cognitive evolution. This identifies three successive transformations of the human mind. Each of these transformations is concerned with new systems of memory representation, but only the third involves forms of memory storage and retrieval which are external to the person. Donald principally associates this development with the forms of notation found in several early state societies, but as contributors to this volume demonstrate, the concept of external symbolic storage can readily be applied to other kinds of material culture in non-literate societies. While earlier humans had depended upon the information-storage capabilities of their own minds, we ourselves now exist in an 'information space' in which the objects which surround us take on the secondary characteristic of constituting memory representations. These 'can externally program the user's brain, that is, create specific states of knowledge that were intended by the creator of the particular external device on display' (Donald 1993, 747). In other words, things are first of all things, and then latterly have the capacity to encode information added to them, in much the way that an external hard disk attached to a computer is primarily an object, which has the attribute of being able to encode information as a string of ones and noughts. Indeed, Donald's account makes much use of the language of artificial intelligence and information-processing, and he describes the emergence of exographic storage as 'a *hardware* change just as real as the biological hardware changes that mediated the first two transitions' (Donald 1993, 745; my emphasis).

This point of view seems to me to rely upon what Charles Taylor describes as an 'atomist-computational' view of mental functioning, which, he says, 'offers us the picture of an agent who in perceiving the world takes in "bits" of information from his or her surroundings and then "processes" them in some fashion, in order to emerge with the "picture" of the world he or she has' (Taylor 1993, 319). The variation which Donald offers is that, after being processed, bits of information are externalized and stored in that external world. This conception of the mind as an information-processing device has a long and honourable history in western thought, but I should like to indicate some ways in which it might be seen as unsatisfactory.

Firstly, computational models of consciousness generally involve objects which exist in the outside world being re-presented inside the mind as images. This seems to be the case, for instance, in Donald's evocation of Baddeley's tripartite model of human memory structure, composed of a 'sketchpad', an 'articulatory loop' and an 'executive' (Donald 1993, 747). Each of these different aspects of the memory function must physically exist somewhere, and it is difficult to evade the implication that the 'sketchpad' at least exists lodged inside the head. Such a conception tends inevitably to establish a division between a realm of things and a realm of absolute consciousness. Worldly objects and the mind that thinks about them are then utterly separate. This distinction was followed in different ways by both Descartes and Edmund Husserl, but in either case it formed the basis for what was presumed to be an exact science of consciousness, which bracketed out the material world (Marion 1996, 74). With both the Cartesian *cogito* and Husserl's *ego* we have a pure being operating in a realm of essences, where experiences take place which are more fundamental or pure than those available in the material world. Worldly experience is predicated upon more primordial mental activities, and for this reason Husserl's phenomenology sought to reduce human experience to a series of archetypal mental events. For Descartes, the mind is a kind of matter (*res cogitans*) whose defining attribute (thinking) divides it categorically from all material things. By beginning with the question of how a thinking mind can come to know the things of the world, traditions of inquiry which have followed Descartes have developed a conception of materiality which is essentially negative.

Computational models rely upon what we might call an 'ontology of the occurrent'. That is, they tend to view material things as unproblematic, because they are simply 'there', in the environment. The way that a thing outwardly appears to us gives us direct access to its fundamental character, so that to experience a thing is to gain objective knowledge of it: this is the foundation of empiricism. In the specific case of Descartes, it is this objective character of worldly things which is considered to be of primary significance: the way in which they can be grasped by consciousness, and described by mathematics. The distinguishing attribute of material

things for Descartes is their extension to fill up space (Cottingham 1992, 239). Thus conceived, objects are constantly presented to consciousness (the matter that thinks) in an unvarying manner. They continuously make available a finite range of information, which the mind can ingest in an atomistic manner, and then express verbally or represent visually. As Taylor argues (1992, 322), this objective character of things is taken as the ground for an imperative towards objectivity of observation, where any distortion or bias is to be avoided. The ideal perspective thus comes to be one which is distant and disengaged, and any degree of involvement with the observed object is considered to compromise the perfect transfer of information. By the same token, the rational and disengaged processing of information is presented as the paradigm of what the mind does under ideal circumstances. For Descartes, reason is the proper and unencumbered use of the mind (Taylor 1992, 320). So ideally the distinction between object and subject is absolute.

Mind and world

As an alternative to the views which I have just sought to characterize, it could be proposed that material objects and thinking subjects are not givens. Instead, they have to be brought into being (e.g. Strathern 1991). Mind, body and world are not ontologically distinct spheres: they are categories which people have created, and which often serve to lead us to misunderstand ourselves. Thinking is not something which takes place in a separate space called the mind: it is a means of engagement in the world, and it would not be possible if we did not already exist in a material world, alongside other beings. Yet very often human beings presume themselves to be free-standing and self-contained 'individuals', possessing a rich internal world which confronts physical reality from a distance, and renders it meaningful.

Fundamental to this argument is the question of exactly what it is that distinguishes us as humans. Cognitive evolutionism seems to imply that our present social and cultural condition is the outcome of the developing processing power of the mind, presumably under particular selective conditions. I suggest the opposite: that the defining characteristic of humanity is not the hardware within, but the relationships between persons. This is not so straightforward as to claim that human beings have social relationships and other animals do not — there are strong arguments to be made that all animate beings find themselves enmeshed in a complex web of relationships (Ingold 1995). It is the character of human involvement in these relationships which is at issue, and this is at most indirectly connected with the biological constitution of human beings. What is unique about humans is the way in which other creatures are 'there for' them, or are disclosed to them (Olafson 1993, 100). This is not an attribute of the mind, but an aspect of the fundamental relationality of humans as linguistic or signifying beings.

We have seen that a computational view of the mind requires that the individual takes in bits of information from the objects in its environment, and processes them. This implies a Cartesian world composed of discrete geometrical entities. When we conceptualize, categorize and talk about the things that surround us, however, we are doing something rather different from what other animals are doing when they negotiate their world. We atomize and objectify entities, effectively severing them from their context. Things do not continually exist in a mode where they represent raw units of thematic information: they have to be made to become objects. That is, they have to *disclose* themselves, to be 'made present', by standing out from the background and being released from their relational context. Perhaps the most distinctive aspect of this objectification of worldly things is that it enables them to be rendered as linguistic objects: they can be named.

This quality of allowing things to *show up* is what Martin Heidegger referred to as 'the clearing': not something which is contained in any one being, but a space of disclosure constituted by signification and by care (Heidegger 1971a, 53). Things reveal themselves in a field which is not the creation of any one person, but which exists in the way that language exists, over and above the human subject (Taylor 1992, 259). Human beings are singled out by the way in which they care; by the way in which their own Being is an issue for them (Heidegger 1962). This, in turn, is a consequence of the fundamentally temporal character of human existence: humans have a past which they draw on in order to understand themselves, they exist alongside others in the present, and they project themselves forward into an anticipated future. Caring, human beings cannot be ambivalent to things, or regard things equally, once they are recognized as definable entities. Some things affect them, or are important to their projects, or are useful to them, and with these things they may establish a closeness, which is not merely geometrical (Heidegger 1971b, 166). So some

things stand out from the background of undifferentiated worldhood because we care about them. Importantly, people can comport themselves towards things in a number of different ways: regarding entities as free-standing objects is only one of the possibilities. Sometimes, things are merely present in our surroundings, submerged in the background, while at other times they are taken up and used as things-for a particular task (Dreyfus 1991, 60). Our conceptual distance from them ebbs and flows, and the character of our understanding of them changes. When we use a thing successfully for carrying out some activity, it can slip away from our notice, as we concentrate on the task itself.

In these activities, it is difficult to separate out some component of what we are doing as a mental representation of a physical activity. The more we succeed in our efforts, the less the things involved are thematized as alienated objects. They recede once more into the background, and our relationship to them ceases to have much to do with the representation of an object (Heidegger 1971b, 167). Thought and practice are here one and the same thing, simply a skilled coping with the world. Now, all this suggests that the condition in which a material thing becomes literally an 'object of thought', distinguished from its context or background, is not merely discontinuous, it is actually out of the ordinary. So sometimes we 'think about' things, but more often we just 'get on with them'. In this latter state, things may not be alienated objects, but they do still form an integral part of our world. Here the word 'world' is used neither to mean a particular planet, nor a gathering of material things, but a structure of *intelligibility*. The world in which we as human beings effectively operate is not a collection of objectively existing geometrical forms, it is characterized by the totality of our involvements, and the way in which things are relevant to us (Dreyfus 1991, 91). Our world is the totality of those things of which we could make sense, and it provides the context for the intelligibility of any one thing.

Language, materiality and experience

Any human act or thought takes place in the context of the world we inhabit. This inhabitation does not simply involve being spatially contained: it has the character of engagement and immersion (Relph 1985, 17). Human beings and their world are the two inseparable sides of a single coin: one cannot be human in the absence of a world, and a world is constituted by the presence of humans. 'Getting on with things' in the world thus means having an understanding of the network of involvements in which we continually find ourselves, and negotiating our way amongst things in their normal state of inconspicuous familiarity. One of the conditions of our embedding in our world is our embodiment, the way in which we constantly find ourselves 'thrown' amongst other things and people as corporeal beings. The Cartesian ideal of disengagement, far from being a description of the proper working of the isolated mind, is an artificial state which requires a disembedding, wresting us free of our bodily involvement in the world. So only under unusual circumstances do people look down on their world, or their own bodies, as if looking at an isolated thing, from a great distance. Grasping things 'neutrally' involves modifying our original comportment towards them.

Moreover, having created such a distanced perspective on material things for ourselves, there is no guarantee that we will acquire a definitive understanding of them. For instance, when the human body is studied as a biological organism by medical science the results are no less 'cultural' than are those when we investigate gender, age grading and ethnicity. These forms of human identity are often perceived as secondary: interpretations of an organism which pre-exists them and whose character is already fixed and known (Butler 1993). But any knowledge of the things of the world is itself created in the world and articulated in language. One of our central problems in understanding materiality is that we imagine that our experiences of things generate an unmediated truth, and that language is then employed in the attempt to convey what we have learned. But language provides both the context and the referents of any worldly experience (Butler 1993, 68). A belief in the absolute primacy of empirical data rests on the supposition that language is something unworldly which the mind uses in the attempt to describe and communicate the experience of physical things. Once more, this implies a categorical separation of the mental and the material.

When we say that any one object 'comes into the clearing', and is disclosed thematically, it is our world that forms the background against which it stands out. Again, this characteristic of 'having a world', being able to place any thing in a context of intelligibility, is distinctively human, and yet it is not something which can be located within any one individual, since it relies so heavily upon a set of cultural practices and understandings. So human beings create their worlds collectively, they inherit

and transform their structures of intelligibility. The difficulty which arises from this is that just as we isolate individual entities and define them as objects which can be distinguished by particular attributes which attach to them, so we often believe that we can isolate individual human beings and distinguish what is definitively human within them as bounded entities. Our relational existential properties are mistaken for monadic traits.

In everyday, common-sense terms we tend to identify ourselves as objects alongside other objects. Our bodies are so much meat and gristle to which some other kind of substance (soul or mind) has been added (Heidegger 1977, 226). Once we conceive of human beings in this objectified way, we inevitably begin to search for the roots of human uniqueness encapsulated within the individual organism, in the form of a bigger brain, more information-processing capacity, or whatever. But as long as we concentrate on humans as biological entities, we will overlook their most significant qualities: the way in which they bring a world into being, and the way in which they allow the things of the world to show up. These are not attributes of the individual organism, but aspects of the fundamentally relational character of human being. It is not helpful to consider these diagnostic aspects of humanity in evolutionary terms, since they will not correlate directly with any physical attribute of the body. Being human is not something which is gradually added to a biological substrate: it is a condition of articulation which either does or does not exist.

We have seen already that cognitivism tends to present the human individual as an irreducible social atom, and that this in turn is often connected with a realist theory of representation. This latter is concerned with the transfer of information across the boundary between the outside world and the mental interior. Images of the world are re-presented inside the mind, while signification involves the externalization of thoughts in a form in which they can be introduced into the mind of another. As Richard Rorty (1989) argues, this perspective presents language as a 'third thing' which exists between ourselves and the world, leaving both selfhood and worldhood as unexamined givens. More recent theories of representation, deriving ultimately from Saussure, place both the integrity of the subject and the transparency of language in question (e.g. Derrida 1976). Far from the subject producing primordial, prelinguistic thoughts and then expressing them in language, it is only within the already existing field of language that a subject can emerge with a sense of identity (Lacan 1977). Language creates human beings, rather than vice versa. Similarly, for thoughts to be transferred from one mind to another, in writing or any other symbolic medium, requires an effective identity of signifier and signified. The word or symbol must represent the signified concept in such a way as to exhaust its meaning, but without adding any supplement. Meaning must be absolute, contained within the signifier, and entirely context-free.

Materiality and memory

This brings us to some possible reservations concerning the notion of external symbolic storage. What this concept seems to require is that ideas which emerge inside a person's mind can be 'downloaded', like a string of binary information, into items of material culture which up to this point were meaning-free, like blank pages or unformatted disks. A first objection to this argument is that it implies that the material world only begins to have this particular kind of significance at the point when people begin to use it as a means of external storage: that is, at a point when culture begins to be overlaid upon nature. This seems to involve the entirely modernist assumption that material things become ontologically different by virtue of their transformation by human action. But the burden of the argument which has been presented here is that things are always potentially meaningful as a consequence of their being in the world. If something shows up to us at all, it is already significant to us. To argue otherwise is to suggest that something which is abject or culturally unintelligible can be 'stamped' with a message and rendered meaningful. Inscription changes the potential range of meanings which can be read out of a thing or a text, but it does not transform something meaningless into something meaningful.

Conversely, it is never the case that the meaning of a thing is fixed, unitary, or unambiguous. Inscription does not involve the encapsulation of a thought into an object or a symbol, so much as a reconfiguration. No matter how much effort the 'author' puts into this act, symbols always demand interpretation. We never read a meaning out of a signifier, we read meaning into it (Olsen 1990). Reading, whether of a text or of a material thing, is *positioned*, in that the reader reads within a particular spatial, temporal and cultural context, and on the basis of a particular life history of their own. Signifiers are inherently ambiguous, and can potentially yield limitless numbers of readings. And as Roland Barthes

(1981) points out, reading is a creative act, which is not a passive scrutiny of a thing but should be seen as an active production of meaning.

None of this is to deny the connection between material things and memory, but it does complicate the issue. Material culture clearly has a mnemonic role, but this is not so straightforward as to constitute a 'bank' of stored ideas. Drawing on the past is always a re-presentation which is mediated in various ways, and while worldly experiences and sensations may 'call the past to mind', this hauling-back is always subject to interpretation. As numerous authors have pointed out, memory itself can be compared to a text which is continually re-worked and reinterpreted in the light of subsequent events (e.g. Fentress & Wickham 1992, 47). It is certainly not a means of transparent access to the past. Nor should remembering be seen as a computational activity carried out by the mind in reaction to worldly stimuli. In his book *How Societies Remember*, Paul Connerton (1989) draws attention to the place of embodiment in memory. According to Connerton, bodily actions (like gesture, standing, dancing, walking, marching, processing) are involved in the drawing back, or re-creation, of meanings sedimented by what he calls 'incorporating' and 'inscribing' practices, although again these experiences are subject to interpretation.

Neolithic Britain

All of these points have considerable bearing on the way in which we consider the changes in material culture which took place at the start of the Neolithic period in Britain, around six thousand years ago. While in the preceding Mesolithic period the inhabitants of Britain had been skilled in producing tools of stone, bone, antler and other materials, the beginning of the Neolithic saw a sudden marked increase in artefactual elaboration (Armit & Finlayson 1992; Kinnes 1988). Because this coincided with the introduction of domesticated plants and animals which had ultimately originated in the Near East, the tendency has been to interpret this process in terms of the arrival of a migrant population, or at least the adoption of Neolithic material culture, either as a package or as individual traits, by indigenous people (Case 1969; Clark 1966; Thomas 1996a). Arguably, both of these perspectives underestimate the extent to which the native communities of Atlantic Europe were actively involved in appropriating and transforming Neolithic cultural forms in order to create something new (for a fuller discussion, see Thomas 1996b, chapter 5).

In Britain, this horizon saw the introduction of pottery, megalithic tombs, earthen long mounds, polished stone axes, flint mines, piercing arrowheads, earthwork enclosures, and collective burial (Piggott 1954). Not all of these traits existed amongst continental Neolithic groups before this time, and they certainly did not all exist together in any one region as a unified assemblage. So we might suggest that this repertoire, which formed a material means of signification, was put together in a process of hybridization or bricolage carried out by formerly Mesolithic communities. This would cast the foraging societies of the Atlantic zone as the active creators of a new kind of Neolithic, distinct from that of the Near East or central Europe, rather than passive recipients of an already formulated package.

Now, to place this material in the context of the debate contained within this volume, it would seem that at around 4000 cal. BC, Britain underwent a revolution in the provision of external symbolic storage. This did not involve the introduction of literacy, but it was concerned with the emergence of a range of material forms which were clearly symbolic, and which had a significance which extended beyond the immediately utilitarian. A new repertoire, or a new material language, had been made available, even if not all of its elements were present in all regions. We might wish to argue that British landscapes now became 'information spaces' in ways that they had not been before. One of the characteristics of the material culture concerned was that it intervened in and transformed a variety of social contexts. Pottery vessels were now used in the production, serving and storage of food, which might be expected to result in changes in interpersonal relationships (Braithwaite 1982; Jones 1996). Polished flint and stone axes had begun to circulate from hand to hand over large distances, allowing the creation of alliances and indebtedness both within and between communities (Edmonds 1995). Ditched enclosed sites, often only temporary structures, allowed large gatherings of people within a space which had been set aside from everyday activities (Edmonds 1993). Other monuments, generally associated with the processing of the remains of the dead, left an enduring mark on the landscape, influencing the patterns of movement of people and livestock and continually bringing the past to mind (Bradley 1993; Tilley 1994). These artefacts certainly represented a new 'technology of meaning', and they were clearly connected with memory, in that they brought clusters of associations and connotations to bear on social situations. But, crucially, there is no indication

that a single fixed or unified code of meaning underlay this repertoire, or that any one artefact had a single cultural signification stamped upon it. One of the characteristics of material symbols is that they are ambiguous and polyvalent, and hence that they only signify in a particular context (Hodder 1986; Tilley 1989). So although the Neolithic artefacts which were used in Britain constitute a distinctive assemblage, they were used together, in context, in order to produce meanings in rather localized and contingent ways.

Two points follow from this. Although these objects were manipulated in ways that drew the past to mind, and played on themes of ancestry, distance and contrast, the lack of a fixed and unitary meaning attached to material things would have meant that conflicting interpretations would have been created. Consequently, this was not a case of meaning being 'put into the bank' and then withdrawn, but the creation of an arena of contestation and conflict between competing views of the world. Secondly, these were not simply dead objects observed by disembodied intelligences. Neolithic material culture was above all performative. It was used by people in day-to-day activities and ritual observances, which involved eating, gesturing, chanting, labouring, moving though constructed spaces. The evocation and creation of meaning was not carried out in an ethereal mental sphere, it was a physical, bodily engagement.

The concept of external symbolic storage is potentially a seductive one for archaeology, since it finds a place for aspects of material culture in a broader evolutionary sequence. It does so, however, at the expense of separating a realm of mind and ideas from the world of material things. Inevitably, archaeological investigation is limited to the latter of these. Contemporary western society has developed a fascination for the concept of 'artificial intelligence', creating a machine which can 'think' like a human. We can argue that one unfortunate effect of this imperative has been to encourage us to conceive of the human mind as being rather like a machine: an information-processing device which operates in abstraction from the surrounding world. This paper has argued that we cannot separate mind from body, the mental from the material, or thought from action. The material world is integral to all human projects: it is not simply fashioned by thoughts which emerge in a separate sphere of mental activity. The creation of systems of notation was doubtless a significant step in social development, but we should recognize that all human existence involves a meaning-producing engagement with materiality. Cultural change takes place in the relationships between people and things, rather than in the head.

Julian Thomas
Department of Archaeology
University of Southampton
Southampton
SO17 1BJ

References

Armit, I. & B. Finlayson, 1992. Hunter-gatherers transformed: the transition to agriculture in northern and western Europe. *Antiquity* 66, 664–76.

Barthes, R., 1981. Theory of the text, in *Untying the Text*, ed. R. Young. London: Routledge & Kegan Paul, 31–47.

Binford, L.R., 1965. Archaeological systematics and the study of culture process. *American Antiquity* 31, 203–10.

Binford, L.R., 1972. Some comments on historical versus processual archaeology, in *An Archaeological Perspective*, ed. L.R. Binford. New York (NY): Seminar Press, 114–21.

Bradley, R.J., 1993. *Altering the Earth.* Edinburgh: Society of Antiquaries of Scotland.

Braithwaite, M., 1982 Decoration as ritual symbol: a theoretical proposal and an ethnographic study in southern Sudan, in *Symbolic and Structural Archaeology*, ed. I. Hodder. Cambridge: Cambridge University Press, 80–88.

Butler, J., 1993. *Bodies that Matter: On the Discursive Limits of 'Sex'.* London: Routledge.

Case, H.J., 1969. Neolithic explanations. *Antiquity* 43, 176–86.

Clark, J.G., 1966. The invasion hypothesis in British archaeology. *Antiquity* 40, 172–89.

Connerton, P., 1989. *How Societies Remember.* Cambridge: Cambridge University Press.

Cottingham, J., 1992. Cartesian dualism: theory, metaphysics and science, in *The Cambridge Companion to Descartes*, ed. J. Cottingham. Cambridge: Cambridge University Press, 236–56.

Derrida, J., 1976. *Of Grammatology.* Baltimore (MD): Johns Hopkins University Press.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition.* Cambridge (MA): Harvard University Press.

Donald, M., 1993. Précis of *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. *Behavioural and Brain Sciences* 16, 737–91.

Dreyfus, H., 1991. *Being-in-the-World: a Commentary on Heidegger's 'Being and Time', Division 1.* Cambridge (MA): Massachusetts Institute of Technology Press.

Edmonds, M.R., 1993. Interpreting causewayed enclosures in the past and the present, in *Interpretative Archaeology*, ed. C. Tilley. London: Berg, 99–142.

Edmonds, M.R., 1995. *Stone Tools and Society: Working Stone in Neolithic and Bronze Age Britain*. London: Batsford.

Fentress, J. & C. Wickham, 1992. *Social Memory*. Oxford: Blackwell.

Guignon, C. (ed.), 1993. *The Cambridge Companion to Heidegger*. Cambridge: Cambridge University Press.

Heidegger, M., 1962. *Being and Time*, trans. J. Macquarrie & E. Robinson. Oxford: Blackwell.

Heidegger, M., 1971a. The origin of the work of art, in *Poetry, Language, Thought*, by M. Heidegger. New York (NY): Harper & Row, 15–88.

Heidegger, M., 1971b. The thing, in *Poetry, Language, Thought*, by M. Heidegger. New York (NY): Harper & Row, 163–86.

Heidegger, M., 1977. Letter on humanism, in *Martin Heidegger: Basic Writings*, ed. D.F. Krell. London: Routledge, 213–65.

Hodder, I.R., 1986. *Reading the Past: Current Approaches to Interpretation in Archaeology*. Cambridge: Cambridge University Press.

Ingold, T., 1995. Building, dwelling, living: how animals and people make themselves at home in the world, in *Shifting Contexts: Transformations in Anthropological Knowledge*, ed. M. Strathern. London: Routledge, 57–80.

Jones, A., 1996. Food for thought: material culture and the transformation in food use from the Mesolithic to the Neolithic, in *The Early Prehistory of Scotland*, eds. T. Pollard & A. Morrison. Edinburgh: Edinburgh University Press, 291–300.

Kinnes, I.A., 1988. The cattleship Potempkin: the first Neolithic in Britain, in *The Archaeology of Context in the Neolithic and Bronze Age*, eds. J. Barrett & I. Kinnes. Sheffield: J. Collis, 2–8.

Lacan, J., 1977. *Écrits: a Selection*. London: Tavistock.

Marion, J.L., 1996. Heidegger and Descartes, in *Critical Heidegger*, ed. C. Macann. London: Routledge, 67–96.

Olafson, F.A., 1993. The unity of Heidegger's thought, in Guignon (ed.), 97–121.

Olsen, B., 1990. Roland Barthes: from sign to text, in *Reading Material Culture*, ed. C. Tilley. Oxford: Blackwell, 163–205.

Piggott, S., 1954. *The Neolithic Cultures of the British Isles*. Cambridge: Cambridge University Press.

Relph, E., 1985. Geographical experiences and being-in-the-world: the phenomenological origins of geography, in *Dwelling, Place and Environment*, eds. D. Seamon & R. Mugerauer. New York (NY): Columbia University Press, 15–32.

Rorty, R., 1989. *Contingency, Irony and Solidarity*. Cambridge: Cambridge University Press.

Strathern, M., 1991. Partners and consumers: making relations visible. *New Literary History* 22, 581–601.

Taylor, C., 1992. Heidegger, language, and ecology, in *Heidegger: a Critical Reader*, eds. H. Dreyfus & H. Hall. Oxford: Blackwell, 247–69.

Taylor, C., 1993. Engaged agency and background in Heidegger, in Guignon (ed.), 317–36.

Thomas, J.S., 1996a. The cultural context of the first use of domesticates in north-west Europe, in *The Origins of Agriculture and Pastoralism in Eurasia*, ed. D. Harris. London: University College London Press, 310–22.

Thomas, J.S., 1996b. *Time, Culture and Identity: an Interpretive Archaeology*. London: Routledge.

Tilley, C.Y., 1989. Interpreting material culture, in *The Meanings of Things*, ed. I. Hodder. London: Unwin Hyman, 185–94.

Tilley, C.Y., 1994. *A Phenomenology of Landscape*. London: Berg.

Chapter 13

Symbolic Behaviour: the Origin of a Spatial Perspective

Ezra B.W. Zubrow & Patrick T. Daly

This paper examines the rise of external symbolic behaviour from a spatial perspective after the human revolution. It reviews the nature, evolution, and processes of spatial representation and provides examples. The material record provides a substantive account of the origins of spatial symbolic behaviour. Early tools and sites, as well as prehistoric maps embed this evidence reflecting the importance of territory, the selective advantage of conscious symbolic spatial behaviour for predator/prey relationships, increased behavioural diversity, and their impact on the forms of human dispersal. Two data bases were created — one of prehistoric maps and the other of maps from ethnographic societies whose subsistence is based upon hunting, fishing, or gathering. Twenty-four conclusions drawn from the two data bases show the importance of locality, way finders, minimal topography, and diversity of symbolic forms. The ability to process spatial knowledge at complex levels has existed at least as far back as the Palaeolithic and appears to be universal to almost all individuals and all societies.

'Go straight ahead' means nothing to the blind.
All's straight ahead that does not lie behind.
Virginia Hamilton Adair

It is clear that something occurred along our ancestral line which distinguished us from other animals.[1] We do not know exactly when, why, or how, but life developed into a more purposeful pursuit. Hominids became capable of more than just animal-like reactions to circumstances. The faculties of intuition, creativity, consciousness, symbolism, abstraction, and knowledge representation that sets our genus and species in a class apart from all others in the animal world emerged. This paper suggests that conscious concerns with location and the symbolic representation and communication of spatial knowledge are fundamental to the dispersal and development of the human line.

The paper is divided into four sections, discussing the nature, evolution, and processes of spatial symbolic behaviour and presents examples of these phenomena from the prehistoric and ethnographic record.

The nature of spatial symbolic behaviour

Most animals are able to locate themselves in and move through a complex spatial matrix. Frequently, they have territories that they will guard with ferocity. Humans are conscious of the location of many types of phenomena and their spatial relationship to each other. They can abstractly consider these relationships, symbolize them, and communicate them to other people. Although the knowledge of location is both conscious and unconscious, here we'll primarily consider the conscious aspects of human spatial knowledge. The focus is the characteristics of spatial symbolic behaviour and the evidence for external representations of spatial knowledge.

Sensory data and spatial knowledge

Is spatial knowledge the result of sensory data alone? While this may be the case with other species, it appears that human spatial knowledge is more than the product of sensory data. Rather, it involves a complex set of sensory data, consciousness, and analysis of spatial information. Let us consider the

simplest case. A person knows that he or she is at a given location. This requires more information than simply a set of x, y, and z co-ordinates. Minimally, both a sense of 'locational awareness' and of 'self-positional awareness' is necessary. It makes little difference whether it is a scholar at a college in Cambridge or a prehistoric hunter at the Lindenmeier site. Both the scholar and the hunter recognize certain landmarks or features which indicate to them a given location (locational awareness) and they are aware of where they are relative to that location (self-positional awareness).

The level of complexity increases when people are cognizant not only of their location but of other locations. Not only are they aware of the landmarks or co-ordinates of their location, but they are conscious of other landmarks, aware of other co-ordinates, and have knowledge of other places. Initially, this information is stored internally in their memory but later, if circumstances so warrant, it can be stored in external symbolic systems. One form is a map. The negative of this is also important. Humans can distinguish the locations and landmarks of where they are from where they are not. They retain this awareness even when one is no longer in direct contact. For example, one can remember where one was last Friday even when they are no longer there. Far more than simple sensory information is being processed, stored, and analyzed. For the purposes of brevity, the terms 'other locational awareness' and 'other positional awareness' describe these concepts.

One of the most common human activities is the communication of spatial knowledge to another person. The scholar lost among the Harvard alleys asking directions, the hunter describing to his friend where to find game, or a Roman asking a slave to bring an amphora of wine share this trait. 'Turn left over there by the River Charles', 'the dik-dik is by the willows' or 'bring me that red wine near the fire' are examples of the recurrent, cross-culturally universal uses of spatial symbolic knowledge. They are so prevalent in everyday society that one frequently is not aware that one is using spatial information. Indeed, the large amounts of symbolic spatial information and operations that are necessary to make, let alone complete, such a request frequently go unnoticed.

'Other-person locational awareness' and 'other-person positional awareness' are necessary additions to the previous concepts of 'other locational awareness', 'other awareness', 'self-locational awareness', and 'self-awareness'. For one to be able to convey direction, one must be able to perceive not only where one is but where the other is and their destination. When one states 'walk over the hill by the blue house', one is aware of the space being passed through and the locations the listener knows or will be able to recognize.[2] The speaker provides new symbolic spatial information about landmarks and co-ordinates that hopefully helps the listener along the way. The spatial information exchange also includes packets of information which inform each individual about the receipt of the information and the level of comprehension. In Hintikka's terms, exchanging locational information creates common spatial knowledge (Hintikka 1962). This requires exchanging sensory information and producing messages which state that the sender is ready to send, the receiver is ready to receive, the message is sent, the message is received, and the message is understood.

Penrose, the Oxford mathematician, has been a major proponent of the insufficiency of sensory data alone (Penrose 1989; 1994). Strong locational thinking would suggest mental qualities of a sort that can be attributed to the logical functioning. Such mental activity is similar to the carrying-out of a complex set of algorithms. A person is conscious of and uses location, proximity and separateness in time and space. When one is lost, one knows that one has a location in time and space even if one does not know exactly where it is. Even in a sensory-deprived environment, one knows that one is somewhere.

Causality, location and evidence of symbolic spatial behaviour

It is difficult to conceive of something that is not located in time or space. Mathematicians, physicists, and various scientists are able to posit such systems. For most people, however, even conceptions of infinity when applied to space and time raise problems in location. Causality does seem to work and laymen understand it in a general and imprecise manner. A wine glass on a table is accidentally pushed, the glass falls, and breaks on the floor. The importance of the spatial relationship 'on the table' to 'on the floor' is as easily understood as the temporal sequence of 'push', 'falling', 'landing'. When one goes to the wine cellar, gets a bottle of wine, places a new glass on the table, fills the glass, and removes the bottle, one recognizes a more complex causal chain of events. It has a more elaborate set of spatial relationships. If one asks a friend to go to the wine cellar in the basement next door, get a bottle, and refill the glass, the amounts of symbolic spatial information that are necessary and are communicated increase immensely.

Hominids recognized this type of causality at a very early period. By the early Palaeolithic, the record shows that they were able to use such complex spatial knowledge and its symbolic representations relatively easily. The evidence is embedded in early tools and early sites. The process of getting a flint cobble from a riverbed, placing it in a position where it may be hit with a hammerstone, hitting it with a hammerstone, keeping and using the tool and discarding the debitage is analogous to the individual getting the wine bottle, filling the glass, drinking the wine, keeping the glass and removing the bottle. The causal sequences have spatial dimensions. When people use these causal systems, they make abstract and conscious use of spatial concepts. Early hominid tool-making required an understanding of location and time. When a hominid tells another hominid to make a stone tool, it is analogous to asking the friend to go to the wine cellar. The fact that, prehistorically, there are stylistic similarities spanning extended time and distance is a clear indication that hominids followed exactly this process and that the information was successfully communicated.

Evolution of symbolic spatial knowledge and knowledge representation

Studying the spatial relationships of animals has a long history. From the time of Aristotle and Pliny, one focus has been the concept of territory. Early territorial studies on birds in the seventeenth century were augmented in the eighteenth century by concepts of population density and limitation. The nineteenth century related individual adaptive values, courtship and life histories to territoriality. By the first half of the twentieth century, the abstractions of 'group territories' were distinguished from 'individual territories', and 'ranges' separated from 'territories'. In the next half century, hominid and primate ecologies were reconstructed. Territory served as a demographic regulating device for early species of *Homo* and *Australopithecus*. It was shown that qualities of the behaviours that constitute territoriality were very heterogeneous, protecting not only space but access to females, space for sexual display, spawning sites, and resting sites to name a few. Territories were classified in various ways. Two types of territories, temporally dependent and spatially floating, where shown to complicate the spatial mosaic. Studies showed that territorial resident animals are more efficient in finding food and evading predators. Boundary studies became empirically more accurate by measuring the permeability of borders using indices of the density of intruders versus the density of expellees. Finally, MacArthur (1972) generalized these concepts formally demonstrating that territoriality is a special form of contest competition. One needs to win only once or twice to demonstrate dominance and thus release competition time for the advantageous collection of resources. Territoriality and spatial abilities are evolutionary advantages and there is evidence that evolution favours those species whose territories are not fixed but are flexible in time and space.

Modern humans are territorial in a broad sense of the word. For *Homo sapiens sapiens*, spatial knowledge and locational analysis are important aspects of territory. What selective advantage does conscious locational knowledge confer on those who actually possess it? There is a difference between behaviour based upon our conscious knowledge of location and our unconscious spatial behaviour. All creatures are able to locate themselves unconsciously. At the simplest level, the addition of consciousness in spatial behaviour increases the possibility for diversity of behaviour. Additionally, it makes possible the external storage of spatial information and the opportunity for analysis. For early hominids, the conscious knowledge of location and the ability to represent and communicate spatial information was advantageous for the predators in predator/prey relationships. By putting oneself in the place of the prey one can predict and give oneself advantages over it. Therefore, a conscious ability to manipulate location may very well be a predator/prey advantage for human predators, even when the prey was ourselves (same genus-same species) or variations of ourselves.

For our remote ancestors the specific ability to analyze sophisticated spatial data was a selective advantage. This ability to understand locational phenomena might originally have been site specific. The more spatially and geographically generalized it became, the more evolutionary and culturally advantageous. There is considerable advantage to move from the step of taking shelter in a particular area to knowing that one may take shelter in any location that has similar characteristics. Building shelters, making tools, following game, moving on paths, or gatherings in an annual round are each improved by the process of generalizing location. Even exogamy is improved by generalized knowledge of location.

Hominids have distributed themselves in the broadest spatial adaptive radiation of all species. They have walked from the tropics to both Arctic and Antarctic circles. Sometimes there have been

long-distance movements but, more frequently, the movements have consisted of short-distance adjustments. Before modern transportation, most long-distance movements occurred once or twice during a person's lifetime. Such migrations occurred when the individual left their birth area. Eventually, they established themselves elsewhere or perished in the attempt. Such dispersal is frequently a determinant or a consequence of population density.

Certain cultures, groups, or individuals indulge in long-distance and permanent dispersal. They do so when it is likely to enhance their economic or reproductive fitness. Alternatively, it may enhance the potential of the kin left behind. For humans, the non-altruistic former and altruistic latter cases are often combined. Hope for a better location with the knowledge that one's removal may improve the local situation has been a frequent cause for migration. Indeed it is a central theme in our mythology and literature. Stories abound about youngest sons who leave home to find their fortune.

Short-term repetitive movements are more frequent. In the course of prehistory there has been only a limited set of patterns. They are:

- hunting, fishing, and gathering with moveable household camps,
- hunting, fishing, and gathering with a non-moveable domestic central camp,
- pastoralism in which the pastoralist takes the household from summer to winter pasture,
- pastoralism where the shepherd leaves the household to follow the animals and then returns,
- slash and burn agriculture where the entire household moves every few years,
- slash and burn agriculture that moves in a circular route around the household and does not require the cultivator to move the household.

One must remember that for both long-term dispersals and short-term spatial adjustments the conscious knowledge of location and the ability to represent it provided considerable adaptive advantages. Not the least of them was the ability to communicate to one's friends and children the disadvantages or advantages of where one has been.

From the perspective of the migrating parties there are essentially two forms of migration. There is pre-determinate migration in which there is foreknowledge of the place to which they are going. People are moving 'to' these places. Such pieces may be where kin are already located or where they know that they have improved subsistence potential. The other type of migration is non-determinate migration in which the migrants do not know where they are going but do know that they must leave where they are. In this case, people are moving 'from' a location. For pre-determinate migration the spatial pattern of the migration is usually in the form of a network. The temporal pattern at any given location usually takes the form of a series of pulses. Non-determinate migration such as takes place by refugees fleeing a battle frequently takes any direction and will have the spatial form of a circular or distorted polygon buffer. The rate of flow will follow a wave pattern. In either case, the migrants know from whence they came and this knowledge is important in their behaviour.

The results of this adaptive radiation have been a clear set of world-wide, regional and local settlement patterns that demonstrate conscious[3] knowledge of spatial patterns. The general prehistoric characteristics of this movement are as follows:

- out of Africa with early occupations in Asia,
- then spreading throughout the Middle East, Europe, and the rest of the Old World,
- with late dispersals into isolated areas such as the New World, Australia, and various major island groups.[4]

The spread of population across the river valleys of Europe noted by Ammerman & Cavalli-Sforza (1984), Greenberg (1991), and Renfrew (1991) are examples. Similarly, the movements eastward towards the Bering Straits and into the New World pointed out by Okladnikov (1983), Hopkins (1967), and Martin & Klein (1984) are similar. Each movement is the aggregate of a set of spatial decisions.

At a more local level, one may examine the spatial characteristics of the contents of a site. Consider the houses in a site. We know that people may distribute themselves or arrange themselves in a variety of ways that range from ordered or regular patterns to clustered patterns, or to random patterns. They may also be intermediary. During the late 1960s numerous studies measured such patterning with various statistics including the popular 'nearest neighbour'. Random scatters of settlement were by far the rarest and the vast majority of cases showed that most settlements fell somewhere between clustered and highly ordered. This is also reflected in the classification schemes of settlement patterns. For example, one may consider the evolutionary system developed by Moholy-Nagy pointing out that settlement patterns developed following natural contours, circular and walled designs, rectangular schemes, cross-cutting boulevard patterns, and regional patterns (Moholy-Nagy 1968).

Like other species, humans maintain charac-

teristic individual distances that vary culturally and are reflected in the material record. Frequently they vary according to class and social status. Higher status is reflected in larger spaces for housing, for domestic activities, and for administrative functions. They also may be located more centrally. Obviously, there are cultural differences but spatial relationships are consciously used as symbols. The same types of spatial semiotics have regional and cultural patterns. Scholars since De Toqueville have noted that North American cultures have tended to be spatially expansive while European and Mediterranean have tended to be spatially intensive.[5]

Processes of spatial symbolic behaviour

The problem with studying the evolution of spatial relations is that it is a process taking place partially at the perceptual level, partially at the level of thought or imagination, and partially at the empirical level. One tests the empirical aspects of spatial knowledge by acting upon it and if it is in error there are significant disincentives. Everyone is familiar with one disincentive. It is being lost. Thus, spatial concepts develop on the forge of trial and error and under the influence of motor and sensory mechanisms. While the achievement of sensory information-gathering and motor activity may provide experience of straight lines, angles, circles and other spatial concepts, representational thought first appears to ignore phenomena such as metric and perspective relationships, proportions and consequently, the development of spatial analysis began with more primitive notions such as topological relationships of proximity, separation, order, and enclosure.

We are all familiar with Euclidean geometry. Most of us are familiar with the advances that have been made since Euclidean geometry including spherical trigonometry and the non-Euclidean geometries developed by Boole and Lobachevsky (Newman 1956). Particular assumptions are relaxed, such as that parallel lines will never meet. Although generally difficult to conceive, the logic and potential reality of such geometries may be accepted under particular circumstances. Similarly, it has been known ethnographically for a long time that spatial perception and knowledge representation may take different forms in other societies. Some societies perform spatial analysis using only part of Euclidean geometry or other forms of spatial processing. Many island societies, for example, do not use the cardinal directions. Instead, they use 'inland' and 'outward' as the directional system. Spatial and temporal directions may be interchanged. Indeed, as Charles Frake showed, in medieval times there was frequently a mixture of time and direction. The compass rose might be divided into hour units or the sundial into directional units (Frake 1994). We continue that interchange when we say 'Take that road at 11:00 o'clock'.

Let us examine some of the spatial processes that have been used by cultures.

Affine geometry is a geometry which involves a definition of parallelism but no other process. If definitions of length and angular measurement are excluded from Euclidean geometry, affine geometry is what remains.

Grouping geometries are geometries which include processes which satisfy the law of a commutative group. These include the operations of composition, inversion, identity, and association.

Haptic geometries are geometries which are limited to a sense of touch and by extension to only places where one has been. Distance is minimized in such geometries.

Homeomorphic geometries are geometries in which two spaces are the same if they are equivalent from the standpoint of topology. For example, in a homeomorphic geometry, two point sets are homeomorphic if they are in a one-to-one correspondence no matter what the distance between the points, i.e. all closed curves are considered the same. Thus, circles, triangles, squares, etc., are the same. In homeomorphic geometries, distance often seems to be ignored.

Syncretic geometries are those in which the elements have geometric properties but are not related to each other in an operational fashion. Explorers meeting societies with syncretic geometries often could not understand why they would be given good directions with regard to rivers but the fact that a river ran into one of the Great Lakes would seemingly be ignored.

Non-permanent geometries are geometries in which there is no concept of the permanence of an object and thus relationships among objects are either non-existent or, more frequently, change over time.

Proximity geometries are geometries in which the most elementary spatial relationship which may be grasped would seem to be that of proximity, i.e. 'nearbyness'. Frequently, they are combined with separation. Neighbouring elements that might be partially blended or confused are clearly demarcated.

Principled geometries are geometries in which all the elements of proximity geometries are included and organized according to a set of principles. One principle is that of succession which is established

when two neighbouring elements are ranged one before another on a thematic axis. Others are the principle of enclosure and the principle of continuity.

Examples

Maps are one of the best forms of material evidence which show that symbolic knowledge representation was used by our ancestors. They demarcate what locational knowledge existed, what symbolic representations were used, and what geographic areas were important. They provide examples of what aspects of the environment were emphasized as well as what techniques for spatial surveying were known. Furthermore, maps have an empirical reality. Although one may interpret maps, there is a reality to the spatial representation which usually has some geographical basis. The prehistory and history of maps represents a method of modelling reality and communicating critical spatial information to the 'other'. In short, from this perspective they are external symbolic storage systems of quantifiable information.

Early studies of prehistoric and early historic maps were undertaken by Bruno Adler (1910) ('Karti prevobytnykh narodov') as well as by Bagrow (1923). It is generally recognized that two areas of research are necessary. One must begin by examining the prehistoric and archaeological corpus, and thus compare it to the ethnographic corpus of similar groups. This is what we do below.

Prehistoric and archaeological maps

Surprisingly, we have been able to collect a considerable corpus of prehistoric and archaeological maps. First, we will illustrate several well known prehistoric maps. Second, we present in tabular form (Table 13.1) a corpus of prehistoric maps based upon the literature with descriptions and references. Third, we draw some general conclusions about the nature of prehistoric and archaeological maps from the corpus.

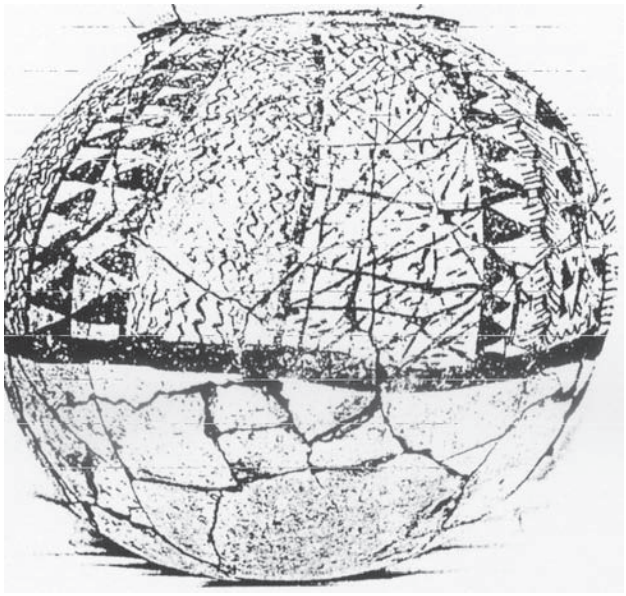


Figure 13.1. *The famous Tepe Gawra landscape jar. (From Tobler 1950, pl. LXXVIIIa.)*

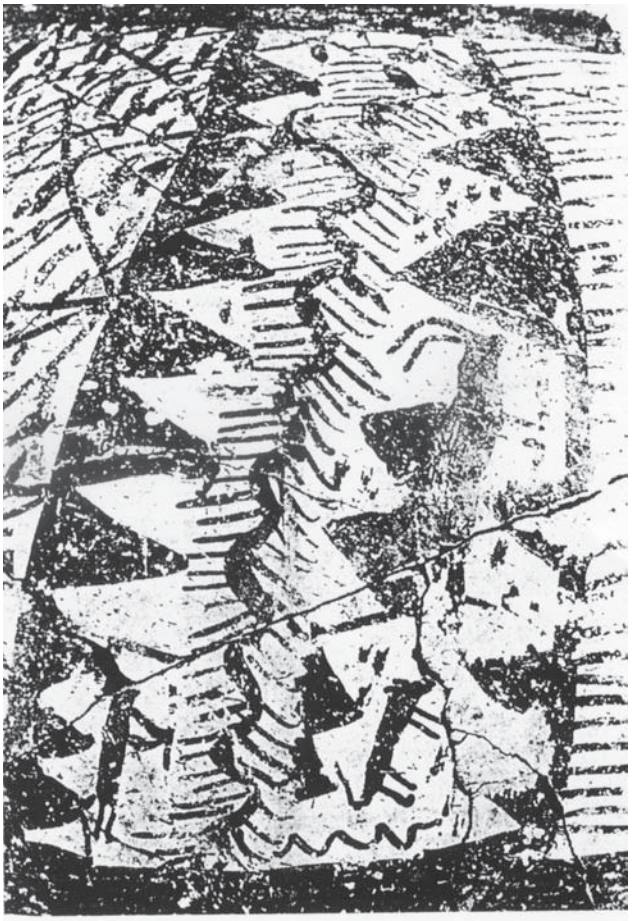


Figure 13.2. *Detail of the map elements from the Tepe Gawra landscape jar. (From Tobler 1950, pl. LXXVIIIb.) The panel has been analyzed as a schematic landscape representation by Tobler (1950). He claims the parallel lines of triangles on both sides of a sinuous line (the river) represent the hills of the river terraces. The herringbone characteristic of the sinuous line represents the river's terraces. The location of animals and towns are also shown. This controversial interpretation may assume too much symbolic representation.*

Figure 13.3. *(Above) Petroglyphic map from Bedolina, Valcomonica (2.3 m × 4.2 m); a complex cultural map tracing boundaries, paths or roads, as well as seeming to locate buildings. Archaeologists such as Anati have suggested that it represents the Bronze age landscape from Castelliere del Dos dell'Archa. There have been arguments about whether the stippled areas in this map represent homesteads or fields. (As published in Imago Mundi 18(1964), 7, fig. 1.)*

Figure 13.4. *The famous Babylonian world map c. 600 BC; an early attempt to depict relationships between places at great distances to each other. The text notes legendary beasts reputed to live beyond the ocean which circles the Babylonian world as well as heroes who have travelled to far places. In one place the 'sun is not seen'. The map represents a Babylon-centred world-view. Shown at 73 per cent of original size. (© Copyright The British Museum.)*

Table 13.1. *A corpus of prehistoric, archaeological, and very early historic maps.*

Type of maps	Name of maps	Brief description of maps	Known references
Prehistoric	The Bedolina petroglyph	Oldest known plan of an inhabited place from northern Italy. Dated to *c.* 2000–1500 BC. Believed to be engraved in different stages, i.e. the pictorial images were added later in the construction.	Thrower 1996; D.-Smith 1982; Kish 1972; Blumer 1964
Prehistoric	The Rajum Hani stone	Plan of a livestock enclosure made in Jordan in the early post AD period. The people depicted in the picture seem to have been placed inside of the enclosure intentionally.	D.-Smith 1987; Harding 1953
Prehistoric	Magoura cave painting	Painting found in Bulgaria. Interpreted as a cosmological map.	D.-Smith 1987; Georgiev 1978; Anati 1969
Prehistoric	Wadi Iddo rock painting	Found in Algeria. Suspected to be a cosmological map.	D.-Smith 1987; Lajoux 1963; Frobenius 1937
Prehistoric	Hagar Qim	Neolithic terracotta found in a temple in Malta. Perhaps a relief model.	D.-Smith 1987; Trump 1979
Prehistoric	Kesslerloch bone plaques	Drawings made by Rödiger of bone pieces with carvings. He argued that they all had cartographic significance.	D.-Smith 1987; Rödiger 1891
Prehistoric	Kesslerlock lignite ornament	An engraved stone interpreted by Rödiger as a topographic map.	D.-Smith 1987; Rödiger 1891; 1890; Merk 1876
Prehistoric	Several images which were considered 'topographical' by Bicknell	These have been interpreted by Bicknell as images of huts and related enclosures as seen from an above vantage point.	D.-Smith 1987; Bicknell 1913; 1903
Prehistoric	Possible map element	A possible image of two people in a hut, from Penalsordo, Badajoz, Spain.	D.-Smith 1987; Acanfora 1960; Breuil 1933
Prehistoric	Possible 'game' enclosures	Two rock paintings which may be cartographic, perhaps represents a sort of enclosure or a topographic feature; from La Pileta, Malaga, Spain.	D.-Smith 1987; Dams 1978; Maringer 1960; Breuil 1915
Prehistoric	Possible map elements from Algeria	This image contains certain features which might be cartographic by virtue of both their actual contents and the spatial relationship which exists between the objects; from I-N-Eten, Tassili Mountains, Algeria.	D.-Smith 1987; Breuil 1954
Prehistoric	Possible map element from Algeria.	Possible image of a camel within an enclosure; from the Tassili Mountains in Algeria.	D.-Smith 1987; Frobenius 1937
Prehistoric	Bronze Age petroglyph	Petroglyph which may show some animals running towards a river; from the Borno Stone from Valcamonica.	D.-Smith 1987; Anati 1960; 1966; Battaglia & Acanfora 1954
Prehistoric	Palaeolithic engraving on mammoth bone	The images in the centre have been interpreted as dwellings which were constructed out of mammoth bones but there has not been a strong correlation between the layout as depicted on the bone carving and the actual layout of the site which it was taken from.	D.-Smith 1987; Pidoplichko 1969
Prehistoric	The Tepe Gawra landscape jar	The painting on the jar has been interpreted as representative of landscape. Tobler has come to the conclusion that it is a hunting scene which is taking place in a valley flanked by high mountains which has a river flowing through it. This has been disputed.	D.-Smith 1987; Goff 1963; Stahl 1960; Tobler 1950
Prehistoric	The Tepe Gawra landscape jar II	This is a close-up of a section of the Tepe Gawre jar from Iraq which may depict a hunting scene in a valley.	D.-Smith 1987; Goff 1963; Stahl 1960; Tobler 1950
Prehistoric	Picture map	Picture map on 'the great disk' from Talat N'iisk, Morocco. Interpreted as containing a river surrounded by mountains on all sides. It is significant because it displays attributes of a schematic nature.	D.-Smith 1987; Malhomme 1959–61
Prehistoric	Picture map from a vase	Picture map on a silver vase found in Mailkop, Russia. Dated to *c.* 3000 BC, it shows two rivers flowing from a chain of mountains. This image has been seen as 'a timid attempt to subordinate landscape with figures'.	D.-Smith 1987; Rostovtzeff 1922
Prehistoric	Wall painting	Wall painting of a map found in Çatalhöyük, Turkey. Dated rather accurately to *c.* 6200 BC. Possible spiritual significance. It is suggested that it is a plan for a town or another type of settlement; perhaps Çatalhöyük itself.	D.-Smith 1982; 1987; Mellaart 1964; 1967; Viragh 1965
Prehistoric	Petroglyph maps (33 maps)	These are typical Bronze Age images, found in the Val Fontanalba valley, Mont Bego. They possess several qualities of topographic maps.	D.-Smith 1982; 1987; Bernardini 1979; Blain & Paquier 1976; Lumley *et al.* 1976; Louis & Isetti 1964; Bicknell 1897; 1902; 1903; 1913
Prehistoric	Simple topographic map	This map from Seradina, Italy seems to show an orderly layout of dwellings with interconnecting paths and perhaps an orchard.	D.-Smith 1982; 1987; Priuli 1985; Harvey 1980; Anati 1960; 1964; 1976; Blumer 1967; 1968
Prehistoric	Simple topographic map II	This map from Ponte, San Rocco, Italy seems to show a scattering of features (perhaps buildings) connected by paths.	D.-Smith 1987; Priuli 1985; Leonardi 1970; Anati 1959

Type of maps	Name of maps	Brief description of maps	Known references
Prehistoric	'The Skin Hill Village' map	Topographic plan from Val Fontanalba, Mont Bego, Italy.	D.-Smith 1982; 1987; Lumley *et al.* 1976; Bicknell 1913
Prehistoric	Map(s) of the 'Monte Bego Village'	Possibly a single map or a collection of smaller maps made on the same template.	D.-Smith 1987; Lumley *et al.* 1976; Bicknell 1913
Prehistoric	Composite petroglyph map from Bedolina	Topographic map from Bedolina, Valcamonica. Possibly a plan of a settlement or a plan of agriculture land usage. 1967; 1968; Anati 1952; 1959; 1964;	D.-Smith 1982; 1987; Priuli 1985; Harvey 1980; Beltran Lloris 1972; Blumer 1964 Battaglia 1934a
Prehistoric	Petroglyph map from Valcamonica	Topographic map from Giadighe, Valcamonia which seems to show some sign of settlement along with natural features such as a river. Some features near the bottom may be anthropomorphic.	D.-Smith 1982; 1987; Priuli 1985; Blumer 1967; Anati 1959; Battaglia 1934
Prehistoric	Piece of a limestone sculpture	Found in Tarxien, Malta this piece of sculpture may be part of a plan of a building.	D.-Smith 1987; Trump 1979; Zammit 1930
Prehistoric	Cup marks on stone	Found at Venslev, Denmark, these cup marks are possibly representative of constellations.	D.-Smith 1987; Schönfeld 1921; Schütte 1920
Prehistoric	Cup marks on stone	Found at Dalby, Denmark, these cup marks are possibly a map of several constellations.	D.-Smith 1982; 1987; Schönfeld 1921; Schütte 1920
Prehistoric	Cosmological map on a bowl	Painting on a bowl from predynastic Egypt. The sun can be seen on its course, there are the mountains of the east and the west, and a primeval ocean encircling the whole scene.	D.-Smith 1987; Giedion 1962
Prehistoric	The Triora stela	Possible cosmological map on a decorated stone. Several levels on it have been interpreted to represent levels of existence; i.e. what we would refer to as the heavens, earth, and the underworld.	D.-Smith 1987; 1982; Anati 1973; Bausani 1973
Prehistoric	Topographic image	Photo of a rock carving found in the valleys of Monte Bego. It seems to show property demarcations along with structural placement.	D.-Smith 1985; Beltran Lloris 1972
Prehistoric	Photo of the Bedolina plan	Rock carving at Capo di Ponte, Val Camonica, Italy made *c.* 1500 BC. Sections of it were added later in the Iron Age.	Blumer 1964
Prehistoric	Restitution of the elements of the Bedolina plan	Drawing of the Bedolina plan as it would look if it was on a map template.	Blumer 1964
Prehistoric	German gold disk	Gold disk found in the Moordorf district of Aurich, dating from the middle of the second millennium BC. It is an image of the cosmos but it contains some geographical depiction.	Unger 1937; D.-Smith 1982; Kish 1980; Jakob-Friesen 1931
Prehistoric[1]	Figure in a plan	Upper Palaeolithic cave painting in Almaden, Spain.	Acanfora 1960
Prehistoric[1]	Cave painting	From Penalsordo, Badajoz, Spain, this painting shows what could be two figures in an enclosure (possibly some sort of dwelling structure).	D.-Smith 1987; Acanfora 1960; Breuil 1933; Frankowski 1918
Prehistoric[1]	Rock painting	Several Neolithic rock paintings from Tamrit, Algeria which appear to have possible map elements.	D.-Smith 1987; Breuil 1954
Prehistoric[1]	Rock painting from Oua Molin	Neolithic rock painting showing several outlines which may be huts.	Tschudi 1955
Prehistoric[1]	Petroglyph from Sefar	Neolithic petroglyph showing an outline of what could be a dwelling and several anthropomorphic figures.	Lajoux 1963
Prehistoric[1]	Rock paintings from Sefar (6 maps)	Neolithic paintings of possible dwellings.	Lajoux 1963
Prehistoric[1]	Petroglyph from Taghit	Neolithic petroglyph showing a figure in a plan.	Frobenius & Obermaier 1925
Prehistoric[1]	Rock painting from Libya	Neolithic painting of a figure in a plan from Jebel Uweinat.	Rhotert 1952; Graziosi 1942; Caporiacco & Graziosi 1934
Ethnographic	Marshall Islands stick chart	A 'rebbelib', which is a chart depicting a large portion of the Marshall Islands group. This covers an area of around 600 sea miles NW–SE and 300 sea miles NE–SW. The spatial relationships between the islands are estimates.	Thrower 1996; Davenport 1960; Lyons 1928
Archaeological	Manuscript map of Mexico City as drawn by the Aztecs	This map depicts the founding of Tenochitlan. It contains both geographical information such as an abstract idea of the layout of the city (with plan of settlement and waterways) and information pertaining to the social geography of the rulers and founding figures of the city.	Thrower 1996; Berdan & Anawalt 1992; Clark 1938
Archaeological? / Ethnohistoric / Ethnographic	Amerindian manuscript map of Mississippi Missouri drainage system	This map was presented by the Iowa Chief Non chi ning ga at a council held in Washington DC in 1837. Drawn in ink, its purpose was to show part of their tribal territory. Although drawn by an aborigine, it was made for the purpose of demarcating land in a 'modern' fashion.	Thrower 1996; Lewis 1979
Archaeological? / Ethnohistoric / Ethnographic	Wood-carved coastal maps from Greenland	These maps clearly show coastal features. They depict altitude as well as area.	Bagrow 1965

Type of maps	Name of maps	Brief description of maps	Known references
Archaeological?/ Ethnographic	Eskimo map on skin	This is a map of the Crown Prince Islands which was printed upon skin.	Bagrow 1965
Archaeological?/ Ethnographic	Bark painting from the Yolngu of NE Arnhem Land Australia	This is a map which was created so that it could only be interpreted in conjunction with other factors. In order for one to be able to make geographic connections one must know the native songs and dances which tell of the creation of the 'Ancestral Being' and its relatives. Each of the parts of the crocodile are named and have cognitive associations which geographical locations and attributes and these are used to teach the children the shape of the land.	Thrower 1996; Turnbull 1989
Archaeological?/ Ethnographic	Abstract maps from the Chippewa (6 maps)	Sketches made by aboriginal Chippewas to describe certain abstract concepts (dreams, cosmos, and spirituality).	Kohl 1860
Archaeological?/ Ethnographic	Native map from the Chippewa	Sketch showing a section of land which was crossed by the drawer. Since the trip was done mostly by canoe there is an emphasis on the river's details.	Densmore 1929
Archaeological?/ Ethnographic	A topographical sketch of the Araguaia	Sketch made by an aboriginal Caraja showing several bends in the river along with two islands.	Ehrenreich 1891
Archaeological?/ Ethnographic	Birch bark map from the Naskapi	Sketch showing a section of the river Atikwabe'o. One method used by hunters to chart the rivers of their hunting grounds.	Speck & Eisley 1942
Archaeological?/ Ethnographic	Bark maps from the Naskapi (5 maps)	Sketches depicting rivers, camps, and hunting grounds. They all show a great deal of geographic knowledge and ability to transfer this knowledge through the use of hard copy maps.	Speck & Eisley 1942
Archaeological?/ Ethnographic	Map of southeastern Labrador	Made by Mathieu Medikabo of the Montagnais. The accompanying literature tells that the initial attempt to construct this map was distorted because it was oriented to internal watersheds.	Leacock 1969
Archaeological?/ Ethnographic	Sketch of 'Spiritual' geography	Sketch mapping out a situation in which a person is being treated for illness. It shows where the accompanying sacrifice (part of the ritual treatment?) goes and where it is intercepted before reaching its final destination (which is also shown) causing the patient to die.	Jochelson 1905–8
Archaeological?/ Ethnographic	Painting of the Garabi Islands (5 maps)	Five paintings showing different sections and views of the islands as well as some of the creatures which inhabit them.	Mountford 1956
Archaeological/ Literate	Early Egyptian map from a wooden sarcophagus	Map showing geographical content (the depiction of the Nile, Ocean, and desert) as it is related to the abstract concept of passage to the afterlife.	Thrower 1996; Kamal 1926–51
Archaeological/ Literate	Plan of a Mesopotamian city on a clay tablet	Map dating from *c.* 1500 BC which depicts a small area in the Nippur district with its canals, the city wall, gates, and various buildings. The early Mesopotamian maps are important because they are the best examples of the early usage of both text and symbol in mapping.	Thrower 1996; Unger 1935; 1937; Merk 1936
Archaeological/ Literate	Map of Mesopotamia on a clay tablet	Akkadian map found at Nuzi dating to 2300 BC. It shows a large-scale view of Mesopotamia complete with mountains, water courses, and settlements.	Thrower 1996; Unger 1935; 1937; Merk 1936
Archaeological/ Literate	World map from Mesopotamia on a clay tablet	Assyrocentric 'world' map depicting a (flat) view of the earth with Babylon at the centre and the Euphrates flowing into the Persian Gulf. There are references to other centres of geographic interest such as near by cities and landmarks.	Thrower 1996; Unger 1935; 1937; Merk 1936
Archaeological/ Literate	Map of Metlatoyuea	This is an example of indigenous Mexican maps as they were made by the Aztecs at the time of the Spanish Colonial Rule. The symbols used on it display similarities to those of European style implying that this map was produced after the conquest. It was painted on cloth and shows settlement and landscape features.	Guzman 1964
Archaeological/ Literate	Maps of Tepetlaoztoc	Two maps from the Codex Tepetlaoztoc printed on European paper.	Guzman 1964
Archaeological/ Literate	Map on bottom of Egyptian coffin	Map to aid the deceased in navigating the mythical landscapes of their spiritual world.	Bonacher 1965; Schackenburg 1903
Archaeological/ Literate	Ground plan on the bottom of an Egyptian coffin	Map to aid the deceased in navigating the mythical landscapes of their spiritual world.	Bonacher 1965; Schackenburg 1903
Archaeological/ Literate	Map on the bottom of an Egyptian coffin II	Map to aid the deceased in navigating the mythical landscapes of their spiritual world.	Bonacher 1965; Schackenburg 1903; Curtius 1923; Rosellini 1834
Archaeological/ Literate	Map on the bottom of an Egyptian coffin III	Map to aid the deceased in navigating the mythical landscapes of their spiritual world.	Bonacher 1965; Schackenburg 1903; Curtius 1923; Rosellini 1834
Archaeological/ Literate	Map on the bottom of an Egyptian coffin IV	Map to aid the deceased in navigating the mythical landscapes of their spiritual world.	Bonacher 1965; Schackenburg 1903; Curtius 1923; Rosellini 1834
Archaeological/ Literate	Map from the Book of the Dead	Map printed on papyri depicting a segment of the text's contents involving passage through a mythical landscape.	Bonacher 1965; Kees 1926; 1933; 1942; Buck 1935; Budge 1924; Eckert 1921; Grapow 1909–1910; Lacau 1904, 1906; Schackenburg 1903; Eisenlohr 1896; Naville 1886; Krünitz 1793

Type of maps	Name of maps	Brief description of maps	Known references
Archaeological/ Literate	Relief map of southern Changsha	Picture of an original map printed on silk *c.* 168 BC; discovered during excavation of Han tombs in 1973.	Chang 1970; 1979; Li-Po 1976; Shih-yung 1976; Buck 1975; Ch'i-Hsiang 1975
Archaeological/ Literate	Garrison map of southern Changsha	This is a picture of a garrison map which was printed on silk around 168 BC. It was discovered in recently excavated tombs from the Han dynasty.	Chang 1970; 1979; Li-Po 1976; Shih-yung 1976; Buck 1975; Ch'i-hsiang 1975
Archaeological/ Literate	Babylonian world map	Map made on a cuneiform tablet *c.* 500 BC. It contains both a drawing and a textual description of the Babylonian Cosmos.	Unger 1935; 1937
Archaeological/ Literate	Cosmos from fresco	Fresco dating to *c.* 2000 BC from Teleilat Ghassul on the Dead Sea. It is of a religious nature with no geographical basis.	Unger 1937; Mallon *et al.* 1934
Archaeological/ Literate	Sumerian tablet	Terracotta tablet dating to *c.* 2100 BC depicting plots of cultivated land which belong to the city of Umma.	Harley 1991

We have drawn the following conclusions from this corpus:

1. Most prehistoric and archaeological maps are drawn at limited scales and portray a very restricted view, i.e. a very localized world view.
2. Most prehistoric maps are exceptionally practical in what is portrayed, emphasizing buildings, fields and routes.
3. It takes a long time for non-local maps to develop. Many millennia passed between the first maps and the earliest maps which present a broader world view.
4. Prehistoric maps tend to emphasize and exaggerate local features at the expense of distant features. Thus there will be different levels of detail within a single map.
5. Prehistoric maps tend to have a focal point in that emphasis and resolution decrease with distance from familiar points. Frequently there is both an increase in scale and a decrease in emphasis as one moves from the centre of the map to the periphery.
6. Many prehistoric maps are pictorial but have map status owing to their display of spatial relationships.
7. Prehistoric maps may show usage, ownership, and horizon marking.
8. Since most prehistoric maps are so local in character one might expect most of the local population to be familiar with the territory depicted. Thus the function of such maps would probably not be as way-finders (Blakemore 1981). Rather, they may be memory devices (templates of familiar geographic space which are used to explain spatial aspects of activity within that area) or mechanisms to communicate information to non-local populations.
9. The images on prehistoric maps tend not to cross cultural boundaries. 'Foreign' does not seem to be a map concept used frequently in prehistory.
10. There does seem to be a degree of similarity across societies and across time for the symbolic or semiotic representation of certain features; for example, wavy lines for rivers.
11. The use of somewhat standardized feature symbols on prehistoric maps means that succeeding individuals or even cultures will be able to recognize some features of the known topography irrespective of the semiotic or symbolic system which may be used in other parts of the social fabric.
12. Finally, there is a long tradition of humanoids externally representing spatial information in symbolic systems.

When dealing with prehistoric images which may depict location, space, or other geographic aspects, the interpretation and verification of these symbols can be problematic. There have been some attempts to institute a standardized criteria (as in the work of Delano Smith) for determining if an image is in fact topographic. Many of the cartographic symbols, however, embody only part of these criteria. In many cases, the symbols show the distinction of location and space. In some cases sequences or parallelism are all that is noted. In others, there are complete plans with proportional principled geometry. One must keep in mind when dealing with prehistoric cases that the material record is not in any way complete and many symbols may not have survived. To determine other methods for externally storing spatial knowledge we must refer to other sources.

Ethnographic maps

While most modern societies make maps, there are many which do not. The more similar ethnographic societies are to early prehistoric societies the easier it is to draw appropriate analogies and inferences. There are many criteria of similarity one might use including economy, social structure, ideology, and demography. Traditionally, ethno-archaeologists have used the easiest criterion of similarity, namely economy. Of those modern societies or historically

Figure 13.5. *Eskimo wood map from the coast of Greenland. This carved map is an excellent example of topographic mapping which considers three dimensions. (Published in Imago Mundi 5 (1965), 93.)*

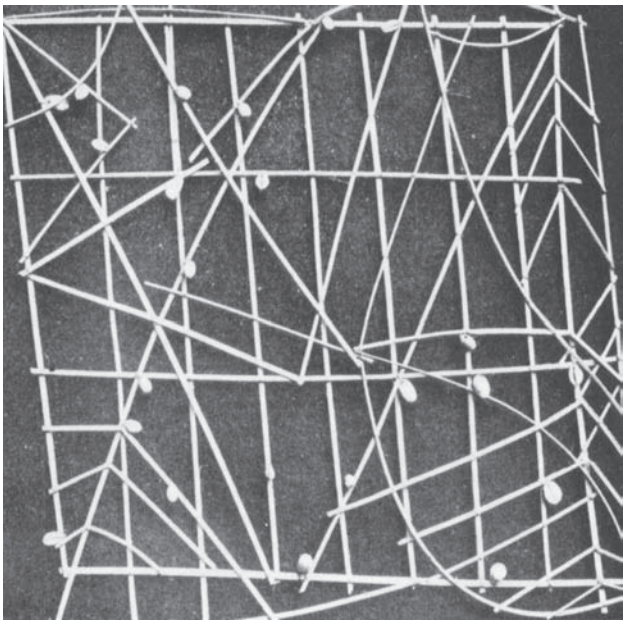


Figure 13.6. *Marshall Island stick chart of the rebbelib type showing wave directions, currents, and islands. (From Lyons 1928, 327; reproduced with permission from the Royal Geographical Society.)*

recent societies which date to that slightly flexible period known as the 'ethnographic present', the most relevant to a discussion of the early evolution of spatial knowledge representation will be societies that relied upon hunting, fishing and gathering. As in the foregoing discussion of prehistoric maps, we present here a few illustrations, then a table derived from a large number of hunting/gathering/fishing societies, and finally an account of the conclusions to be drawn from the corpus.

Table 13.2 summarizes the results from approximately 65 societies distinguished by subsistence. It was created by a systematic examination of all the societies in the Human Relations Area Files which had been labelled as relying on hunting, gathering or fishing as their primary form of subsistence. The ethnographies were searched under the following subjects:

- recording devices
- recorded histories
- proper maps
- routings and nautical charts
- representative art
- cosmological maps
- ethnogeography

We debated which measures should be used to determine the existence of material spatial knowledge representations or maps. Ultimately, a very conservative set of criteria was used. We deemed it inadequate if an ethnographer stated that 'there were native pictures of the area', 'natives drew routes', or 'charts were made'. The reasoning was that one could not be sure of the exact character of the 'potential map' from the text. Thus, the final criterion was an actual illustration of the map in the ethnography or ethnographic files. Table 13.1 presents the results. Several caveats are appropriate. First, there may be other categories under which maps and illustrations may appear. Second, the results are partly determined by the ethnographers' interests. Some anthropologists record spatial data and are interested in native maps, while others show a sublime disinterest. Thus there may be 'mapping' societies that we have mislabelled. Third, the ethnographic record is incomplete in many ways. Some societies have never been studied. Some ethnographies were not included in the HRAF corpus. Thus, this table should be taken with an appropriate 'grain of salt' and should be considered a first pass and indicative of trends rather than a final statement.

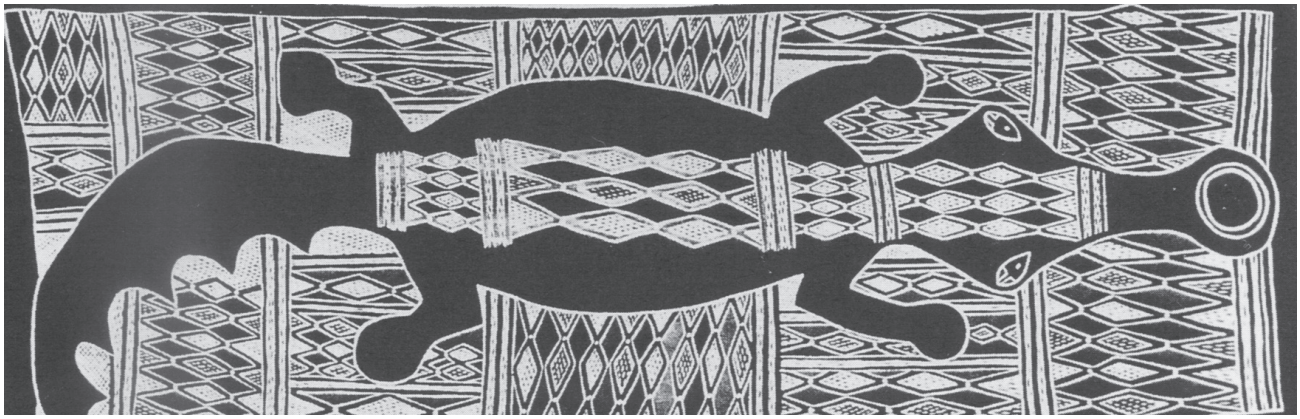


Figure 13.7. *Australian bark painting from Arnhem Land. To be of any value in communicating spatial knowledge this map must be viewed in conjunction with certain oral traditions. (From Thrower 1996, 11; reproduced with the kind permission of Galarrwuy Yunupingu, Northern Land Council, Casuarina N.T., Australia.)*

Several conclusions may nonetheless be drawn from an examination of these ethnographic maps.

1. They are relatively rare. Map making is not integral to many hunting, gathering and collecting societies.
2. Topography is relevant. People who live in areas where topography is minimal tend to use more maps and the maps are more detailed and accurate. This is exemplified by maps of the Copper Eskimo.
3. Maps tend to be dependent upon the expanse of territory covered in daily interaction. The larger the territory and the greater the interaction, the higher the probability of maps.
4. In most of these societies individuals do not need maps for their local ranges. Rather, they need maps when leaving their local range or helping others to find their way into the local range.
5. Map-making tends to be dependent upon mode of transport. As one would expect, those societies which use boats or animals for transport will more frequently require maps.
6. The greater the uncertainty in the subsistence pattern and the more numerous the variables contributing to this uncertainty, the greater the tendency to make maps.
7. Within a society there is little standardization of maps regarding scale or features. Thus, two maps will be very different; examining different areas, emphasizing different attributes, and oriented from different directions. Such cartographic symbols as the wavy line for a river or an inverted triangle for hills, however, are frequently standardized within the society. Sometimes they are standardized across societies.
8. In many of these societies map-making is not a secular but a religious or ideological activity. Many maps demonstrate this by showing the geographical relationships between heaven or other cosmological locations and the area of local interest.
9. Map-making may be integral to subsistence. Yet there are very few thematic maps at all, let alone those emphasizing subsistence.
10. For some societies the purpose lay in making the map not the map itself. Geography is taught or communicated through the process of creating the map thus the map is just a by-product.
11. In many of the societies there is considerable spatial consciousness that does not correlate with map-making.
12. Cultures contending with dynamic environments frequently represent the dynamic characteristics which are relevant to subsistence and travel in maps. A good example of this are the Marshall Islands navigational charts which show current direction.

Conclusions

We have examined the rise of external symbolic behaviour after the human revolution from a spatial perspective, reviewing the nature, evolution, and processes of spatial representation and providing examples. Sensory data and communication of spatial information among individuals are critical for the development of external spatial symbolic systems. The material record provides a substantive account of the origins of spatial symbolic behaviour. Early tools and sites, as well as prehistoric maps, embed this evidence. The evolution of spatial symbolic

Table 13.2. *A corpus of ethnographic maps from hunting, gathering, and fishing societies.*

Tribe	Recording devices	Recorded histories	Proper maps	Routings and nautical charts	Representative art	Cosmological maps	Ethnogeography	Hunting	Fishing	Collecting
Semang	–	–	–	–	Yes	–	–	–	–	Yes
Vedda	–	–	–	–	–	–	–	–	–	Yes
Kung	–	–	–	–	–	–	–	–	–	Yes
Mbuti	–	–	–	–	–	–	–	–	–	Yes
Bergdama	–	–	–	–	–	–	–	–	–	Yes
Hukundika	–	–	–	–	–	–	–	–	–	Yes
Miwok	–	–	–	–	–	–	–	–	–	Yes
Nomlaki	–	–	–	–	–	–	–	–	–	Yes
Atsugewi	–	–	–	–	–	–	–	–	–	Yes
Diegueno	–	–	–	–	–	–	–	–	–	Yes
Tubatulabal	–	–	–	–	–	–	–	–	–	Yes
Yokuts	–	–	–	–	–	–	–	–	–	Yes
Yuki	–	–	–	–	–	–	–	–	–	Yes
Maricopa	–	–	–	–	–	–	–	–	–	Yes
Washo	–	–	–	–	–	–	–	–	–	Yes
Murngin	–	–	–	–	–	–	Yes	–	–	Yes
Tiwi	–	–	–	–	–	–	–	–	–	Yes
Aranda	–	–	–	–	–	–	–	–	–	Yes
Miskito	–	–	–	–	–	–	–	–	–	Yes
Chamacoco	–	–	–	–	–	–	–	–	–	Yes
Choroti	–	–	–	–	–	–	–	–	–	Yes
Guato	–	–	–	–	–	–	–	–	–	Yes
Nambicuara	–	–	–	–	–	–	–	–	–	Yes
Warrau	–	–	–	–	–	–	–	–	–	Yes
Chirichua-Apache	–	–	–	–	–	–	–	–	–	Yes
Ainu	–	–	–	–	Yes	–	–	–	Yes	–
Bozo	–	–	–	–	–	–	–	–	Yes	–
Copper Eskimo	–	–	–	–	–	–	Yes	–	Yes	–
Kwakiutl	–	–	–	–	–	–	–	–	Yes	–
Kutenai	–	–	–	–	–	–	–	–	Yes	–
Cree	–	–	–	–	–	–	–	–	Yes	–
Sanpoil	–	–	–	–	–	–	–	–	Yes	–
Tolowa	–	–	–	–	–	–	–	–	Yes	–
Yurok	–	–	–	–	–	–	–	–	Yes	–
Seri	–	–	–	–	–	–	–	–	Yes	–
Manus	–	–	–	–	–	–	–	–	Yes	–
Truk	–	–	–	–	–	–	Yes	–	Yes	–
Tikopia	–	–	–	–	–	–	–	–	Yes	–
Ket	–	–	–	–	–	–	–	–	Yes	–
Gilyak	–	–	–	–	–	–	–	–	Yes	–
Koryak	–	–	–	–	Yes	–	–	–	Yes	–
Alacaluf	–	–	–	–	–	–	–	–	Yes	–
Yahgan	–	–	–	–	–	–	–	–	Yes	–
Mataco	–	–	–	–	–	–	–	–	Yes	–
Caraja	–	–	–	–	Yes	–	Yes	–	Yes	–
Tucuna	–	–	–	–	–	–	–	–	Yes	–
Callinago	–	–	–	–	–	–	–	–	Yes	–
Dorobo	–	–	–	–	–	–	–	Yes	–	–
Sarsi	–	–	–	–	–	–	–	Yes	–	–
Naskapi	–	–	–	Yes	Yes	–	Yes	Yes	–	–
Penobscot	–	–	–	–	–	–	–	Yes	–	–
Comanche	–	–	–	Yes	–	–	–	Yes	–	–
Crow	–	–	–	–	–	–	–	Yes	–	–
Omaha	–	–	–	–	–	–	Yes	Yes	–	–
Gros Ventre	–	–	–	–	–	–	–	Yes	–	–
Kiowa Apache	–	–	–	–	–	–	–	Yes	–	–
Cheyenne	–	–	–	–	–	–	–	Yes	–	–
Ute	–	–	–	Yes	–	–	–	Yes	–	–
Yukaghir	–	–	–	–	–	–	–	Yes	–	–
Guahibo	–	–	–	–	–	–	–	Yes	–	–
Siriono	–	–	–	–	–	–	–	Yes	–	–
Ona	–	–	–	–	–	–	–	Yes	–	–
Tehuelche	–	–	–	–	–	–	–	Yes	–	–
Abipon	–	–	–	–	–	–	–	Yes	–	–
Caduveo	–	–	–	–	–	–	–	Yes	–	–
Aweikoma	–	–	–	–	–	–	–	Yes	–	–
Bororo	–	–	–	–	–	–	Yes	Yes	–	–

behaviour reflects the importance of territory in human conduct. Furthermore, from an evolutionary perspective, we suggest that conscious symbolic spatial behaviour has selective advantages. It provides increased behavioural diversity and advantages in predator/prey relationships. Furthermore, it impacts on the forms of human dispersal. Both pre-determinate and non-determinate migration require spatial knowledge in a variety of symbolic forms. The processes by which various societies have organized and symbolized spatial phenomena have not been the same cross-culturally, nor across time. The twenty-four conclusions drawn from the two data bases presented here support several key themes

including their 'locality and provinciality', their function as more than 'way finders', their importance in relation to minimal topography, and their diversity regarding symbolic forms and usage. Perhaps the most fascinating conclusion which was drawn from this research is the immense versatility in human spatial cognition. Most of the cultures encountered from both the ethnographic study and prehistoric corpus of maps had a culturally unique perspective to the way that they conceived space and in turn represented it symbolically. The ability to process spatial knowledge at complex levels has existed at least as far back as the early Palaeolithic, and has been in all human societies since that time.

Ezra B.W. Zubrow
National Center for Geographic Information Analysis
SUNY at Buffalo
Buffalo, NY 14261-0023
USA
&
Patrick T. Daly
Department of Anthropology
SUNY at Buffalo
Buffalo, NY 14261-0005
USA

References

Acanfora, M.O., 1960. *Pittura dell'eta preistorica*. Milan: Societa Editrice Libraria.

Adler, B., 1910. Karty Pervobytnykh Narodov. *Izvestiya Imperatorskogo Obshchestva Lyubiteley Yestestvoznaniya, Antropologii I Ethnografii: Trudi Geograficheskogo Otdeleniya* 119(2).

Ammerman, A.J. & L. Cavalli-Sforza, 1984. *Neolithic Transition and the Genetics of Populations in Europe*. Princeton (NJ): Princeton University Press.

Anati, E., 1959. Les travaux et les jours aux Ages des Metaux du Val Camonica. *L'Anthropologie* 63, 248–68.

Anati, E., 1960. *La civilisation du Val Camonica*. Paris: B. Arthaud.

Anati, E., 1964. *Camonica Valley*, trans. L. Asher. London: Jonathan Cape.

Anati, E., 1966. *Il masso di borno*. Brescia: Camuna.

Anati, E., 1969. Magourata Cave. *Archaeology* 22, 92–100.

Anati, E., 1973. La stele di Triora (Liguria). *Bollettino del Centro Camuno di Studi Preistorici* 10, 101–26.

Anati, E., 1976. *Evolution and Style in Camunian Rock Art*, trans. L. Diamond. Capo di Ponte: del Centro.

Bagrow, L., 1928. *Ortelii Catalogus cartographorum in Petermannís Geographisschen Mitteilungen* v43, v45.

Bagrow, L., 1964. *History of Cartography*, revised by R.A. Skelton, trans. D.L. Paisey. Cambridge (MA): Harvard University Press.

Bagrow, L., 1965. Eskimo maps. *Imago Mundi* 5, 93–5.

Battaglia, R., 1934a. Incisioni rupestri di Valcamonia, in *Proceedings of the First International Congress of Prehistoric and Protohistoric Sciences, London August 1–6 1932*. London: Oxford University Press, 234–7.

Battaglia, R., 1934b. Ricerche etnografiche sui petroglifi della Cerchia Alpina. *Studi Etruschi* VIII, 11–48.

Battaglia, R. & M.O. Acanfora, 1954. Il masso inciso di Borno in Valcamonica. *Bollettino di Paletnologia Italiana* 64, 225–55.

Bausani, A., 1973. Interpretazione paleo-astronomica della stele di Triora. *Bollettino del Centro Camuno di Studi Preistorici* 10, 127–34.

Beltran Lloris, M., 1972. Los grabados rupestres de Bedolina (Valcamonica). *Bollettino del Centro Camuno di Studi Preistorici* 8, 121–58.

Berdan, F.F. & P.R. Anawalt (eds.), 1992. *The Codex Mendoza*, 4 vols. Berkeley & Los Angeles (CA): University of California Press.

Bernardini, E., 1979. *Le Alpi Marittime e le meraviglie del Monte Bego*. Genoa: SAGEP Editrice.

Bicknell, C.M., 1897. Le figure incise sulle rocce di Val Fontanalba. *Atti della Societa Ligustica di Scienze Naturali e Geografiche* 8, 391–411.

Bicknell, C.M., 1902. *The Prehistoric Rock Engravings in the Italian Maritime Alps*. Bordighera: P. Gibelli.

Bicknell, C.M., 1903. *Further Explorations in the Regions of the Prehistoric Rock Engravings in the Italian Maritime Alps*. Bordighera: P. Gibelli.

Bicknell, C.M., 1913. *A Guide to the Prehistoric Rock Engravings in the Italian Maritime Alps*. Bordighera: G. Bessone.

Blain, A. & Y. Paquier, 1976. Les gravures rupestres de la Vallee des Merveilles. *Bollettino del Centro Camuno di studi Preistorici* 13–14, 109–19.

Blakemore, M.J., 1981. From way-finding to map-making: the spatial information fields of Aboriginal peoples. *Progress in Human Geography* VI, 1–24.

Blumer, W., 1964. The oldest known plan of an inhabited site dating from the Bronze Age. *Imago Mundi* 18, 9–11.

Blumer, W., 1967. Felsgravuren aus prähistorischer Zeit in einem oberitalienischen Alpental ältester bekannter Ortsplan, Mitte des zweiten Jahrtausends v. Chr. *Die Alpen*.

Blumer, W., 1968. Ortsplan von Bedolina: Felsgravur um die Mitte des zweiten Jahrtausends v. Chr. *Kartographische Nachrichten* 18, 10–13.

Bonacher, W., 1965. The Egyptian Book of the Two Ways. *Imago Mundi* 7, 5–17.

Breuil, H., 1933. *Les peintures rupestres schematiques de la Peninsule Iberique*, 4 vols. Paris: Fondation Singer-Polignac, Imprimerie de Lagny.

Breuil, H., 1954. *Les roches peintes du Tassili-n-Ajjer*. Paris: Arts et Metiers Graphiques.

Breuil, H., H. Obermaier, & W. Verner, 1915. *La Pileta a Benaojan*. (Impr. Artisique V.) Monaco: A. Chene.

Buck, A. de, 1935. *The Egyptian Coffin Texts*. (Publication 34.) Chicago (IL): University of Chicago, Oriental Institute.

Buck, D.D., 1975. Three Han Dynasty Tombs at Ma-wang-tui. *World Archaeology* 7, 30–45.

Budge, E.A.W, 1924. *A Guide to the First, Second, and Third Egyptian Rooms*. 3rd edition. London: Trustees of the British Museum.

Caporiacco, L. di & P. Graziosi, 1934. *Le pitture rupestri di Ain Doua (el-Auenat)*. Florence: Istituto Geografico Militare.

Chang, K.-S., 1970. Africa and Indian Ocean in Chinese maps of the fourteenth and fifteenth centuries. *Imago Mund*i 24, 21–30.

Chang, K.-S., 1979. The Han maps: new light on cartography in Classical China. *Imago Mundi* 31, 9–17.

Ch'i-hsiang, T., 1975a. A map more than 2100 years old. *People's Pictorial* 9, 34–7.

Ch'i-hsiang, T., 1975b. A map more than 2100 years old. *Wen-wu* 2.

Clark, J.C. (ed.), 1938. *Codex Mendoza*. London: Waterlow & Sons.

Curtius, L., 1923. Die antike Kunst. Ägypten und Vorderasien, in *Handbuch der Kunstwissenschaft*, ed. A.E. Brinckmann. Berlin: Neubabelsberg.

Dams, L., 1978. *L'art paleolithique de la caverne de la Pileta*. Graz: Akademische Druck.

Davenport, W., 1960. Marshall Island navigation charts. *Imago Mundi* 15, 19–26.

Delano Smith, C., 1982. The emergence of maps in European rock art: a prehistoric preoccupation with space. *Imago Mundi* 34, 9–25.

Delano Smith, C., 1985. The origins of cartography, an archaeological problem: maps in prehistoric rock art, in *Papers in Italian Archaeology* IV, pt 2: *Prehistory*, ed. C. Stoddart & S. Stoddart. (British Archaeological Reports International Series 244.) Oxford: BAR, 205–19.

Delano Smith, C., 1987. Prehistoric maps and the history of cartography: an introduction, in Harley & Woodward, vol. 1, 45–50.

Delano Smith, C., 1988. Archaeology and maps in prehistoric art: the way forward. *Bollettino del Centro Camuno di Studi Preistorici* 24, 99–112.

Densmore, F., 1929. *Chippewa Customs*. Washington (DC): Government Printing Office.

Eckert, M., 1921. *Die Kartenwissenschaft*. Berlin & Leipzig: W. de Gruyter.

Ehrenreich, P., 1891. *Beiträge zur Völkerkunde Brasiliens.* Berlin: Königlich Museum für Völkerkunde, Veröffentlichungen.

Eisenlohr, W., 1842. *Ein Altbabylonischer Felderplan*. Leipzig: J.C. Hinrichs.

Frake, C.O., 1994. Dials: a study in the physical representation of cognitive systems, in *The Ancient Mind: Elements of Cognitive Archaeology*, eds. C. Renfrew & E.B.W. Zubrow. Cambridge: Cambridge University Press, 119–32.

Frankowski, E., 1918. *Horreos y palafitos de la Peninsula Iberica*. (Comision de Investigaciones Paleontologicas y Prehistorica 18.) Madrid: Museo National de Ciencias Naturales.

Frobenius, L., 1937. *Ekade Ektab: Die Felsbilder Fezzans*. Leipzig: Harrassowitz.

Frobenius, L. & H. Obermaier, 1925. *Hadschra Maktuba: Urzeitliche Felsbilder Kleinafrikas*. Munich: K. Wolff.

Georgiev, G.I., 1978. Forschungsstand der alten Felskunst in Bulgarien, in *Acts of the International Symposium on Rock Art: Lectures at Hanko 6–12 August 1972*, ed. Sverre Marstrander. Oslo: Universitetsforlaget, 68–84.

Giedion, S., 1962. *The Eternal Present: the Beginnings of Architecture*, vol. 6. (Bollingen Series 35.) New York (NY): Bollingen Foundation.

Goff, B.L., 1963. *Symbols of Prehistoric Mesopotamia*. New Haven (CT): Yale University Press.

Grapow, H., 1909–10. Zweiwegebuch und Totenbuch. *Zeitschrift für ägyptische Sprache und Altertumskunde* 46.

Graziosi, P., 1942. *L'Arte rupestre della Libia*. Naples: Edizioni della Mostra d'Oltremare.

Greenberg, J.H., 1991. Some problems of Indo-European in historical perspective, in *Sprung From Some Common Source: Investigations into the Prehistory of Languages*, eds. S.M. Lamb & E.D. Mitchell. Stanford (CA): Stanford University Press, 125–41.

Harding, G.L., 1953. The cairn of Hani. *Annual of the Department of Antiquities of Jordan* 73, 8–56.

Harley, J.B., 1991. The new history of cartography. *UNESCO Courier* (June 1991), 10–16.

Harley, J.B. & D. Woodward, 1987. *The History of Cartography*. Chicago (IL): University of Chicago Press.

Harvey, P.D.A., 1980. *The History of Topographic Maps: Symbol, Pictures, and Surveys*. London: Thames & Hudson.

Hintikka, J., 1962. *Knowledge and Belief*. Ithaca (NY): Cornell University Press.

Hopkins, D.M. (ed.), 1967. *The Bering Land Bridge*. Stanford (CA): Stanford University Press.

Hutorowicz, H. de, 1911. Maps of primitive people. *Bulletin of the American Geographical Society* 43, 669–79.

Jakob-Friesen, K.H., 1931. Himmelskult im alten Norden. *Forschungen und Fortschritte* 7.

Jochelson, V.I., 1905–8. *The Koryak*. Leiden: E.J. Brill.

Kamal, Prince Y., 1926–51. *Monumenta cartographica Africae et Aegypte*, 5 vols. Cairo. Microfilm (negative). New York (NY): New York Public Library ACG-4476.

Kees, H., 1926. *Totenglauben und Jenseitsvorstellungen der alten Ägypter*. Leipzig: J.C. Hinrichs.

Kees, H., 1933. *Kulturgeschichte des alten Orients: Ägypten*. (Handbuch der Altertumswissensch.) Munich: Beck.

Kees, H., 1942. Die Feuerinsel in den Sargtexten und im Totenbuch. *Zeitschrift für ägyptische Sprache und Altertumskunde* 78, 41–53.

Kish, G., 1972. *History of Cartography*. New York (NY): Harper & Row.

Kish, G., 1980. *La carte: Image des Civilizations*. Paris: Seuil.

Kohl, J.G., 1860. *Kitchi-Gami*. London: Chapman & Hall.

Krünitz, J.G., 1793. *Land-Karte*. (Ökonom-technol. Enzykl.

60.) Berlin.
Lacau, P., 1904, 1906. *Catalogue general des Antiquites egyptiennes du Musee du Cairo. Sarcophages anterieurs au Nouvel Empire*. Cairo: Institut Français d'Archéologie Orientale.
Lajoux, J.D., 1963. *The Rock Paintings of the Tassilii*, trans. G.D. Liversage. London: Thames & Hudson.
Le Gear, C.E., 1944. Map-making by primitive people. *Special Libraries* 35(3) (March), 79–83.
Leacock, E.B., 1969. The Montagnais-Naskapi band, in *Contributions to Anthropology: Band Societies*, ed. D. Damas. Ottawa: Queens Printer.
Leonardi, P., 1970. Su alcuni petroglifi della Valcamonica e della Venezia Tridentina, in *Symposium International d'Art Prehistorique, Valcamonica, 23–8 Septembre 1968 Union Internationale des Sciences Prehistoriques et Protohistoriques*, ed. E. Anati. Capo di Ponte: Edizioni del Centro, 235–9.
Lewis, G.M., 1979. The indigenous maps and mapping of North American Indians. *The Maps Collection* 9 (December), 25–32
Li-po, C., 1976. A study of the excavated garrison map from Ma-wang-tui. *Wen-wu* 21, 24–7.
Louis, M. & G. Isetti, 1964. *Les gravures prehistoriques du Mont-Bego*. Bordighera: Institut International d'Etudes Ligures.
Lumley, H. de, M.-E. Fonvielle & J. Abelanet, 1976. Vallee des Merveilles. *Union International des Sciences Prehistoriques et Protohistoriques, IX congres, Nice 1976* Livert- Guide de l'Excursion C1.
Lyons, H. (Sir), 1928. The sailing charts of the Marshall islanders. *Geographical Journal* 72(4) (October), 325–9.
MacArthur, R.H., 1972, 1984. *Geographical Ecology: Patterns in the Distribution of Species*. Princeton (NJ): Princeton University Press.
Malhomme, J., 1959–61. *Corpus des gravures rupestres du Grand Atlas*. Rabat: Service des Antiquites du Maroc.
Mallon, A., R. Koppel & R. Neuville, 1934. *Teleilat Ghassul*. (Scripta Pontificii Instituti Biblici.) Rome: L'Institut.
Maringer, J., 1960. *The Gods of Prehistoric Man*. 2nd edition. London: Weidenfeld & Nicolson.
Marshack, A., 1972. *The Roots of Civilization: the Cognitive Beginnings of Man's First Art, Symbol, and Notation*. London: Weidenfeld & Nicolson.
Martin, P. & R.G. Klein (eds.), 1984. *Quaternary Extinctions: a Prehistoric Revolution*. Tucson (AZ): University of Arizona Press.
Meek, T.J., 1936. The orientation of Babylonian maps. *Antiquity* 10, 223–6.
Mellaart, J., 1964. Excavations at Çatal Hüyük, 1963, 3rd preliminary report. *Anatolian Studies* XIV, 39–119.
Mellaart, J., 1967. *Çatal Hüyük: a Neolithic Town in Anatolia*. London: Thames & Hudson.
Merk, C., 1876. *Excavations at the Kesslerloch Near Thayngen, Switzerland, a Cave of the Reindeer Period*. London: Longmans, Green.
Moholy-Nagy, S., 1968. *Matrix of Man: an Illustrated History of Urban Environment*. New York (NY): Praeger.
Mountford, C.P., 1956. *Records of the American Australian Scientific Expedition to Arnhem Land*, vol. 1: *Art, Myth, and Symbolism*. Melbourne: Melbourne University Press.
Naville, E., 1886. *Das ägyptische Todtenbuch der XVIII Dynastie*. Berlin: Asher.
Newman, J.R., 1956. *The World of Mathematics*, vol. 3. New York (NY): Simon and Schuster.
Okladnikova, E.A., 1983. California collection of I.G. Voznesensky and the problems of ancient cultural connections between Asia and America. *Journal of California and Great BasinAnthropology* 5(1–2), 224–39.
Penrose, R., 1989. *The Emperor's New Mind: Concerning Computers, Minds, and the Laws of Physics*. Oxford: Oxford University Press.
Penrose, R., 1994. *Shadows of the Mind: a Search for the Missing Science of Consciousness*. Oxford: Oxford University Press.
Pidoplichko, I.G., 1969. *Pozdnepaleoliticheskie Zhilishcha iz Kostey Mamonta na Ukraine* [*Late Paleolithic Dwellings of Mammoth Bone in the Ukraine*]. Izdatelstvo: Naukova Dumka.
Priuli, A., 1985. *Incisioni rupestri della Val Camonica*. Ivrea: Priuli and Verlucca.
Renfrew, C., 1991. Before Babel: speculation on the origins of linguistic diversity. *Cambridge Archaeological Journal* 1(1), 3–23.
Rhotert, H., 1952. *Libysche Felsbilder: Ergebnisse der XI und XII. Deutschen Inner-Afrikanischen Forschungs-Expedition (DIAFE) 1933/1934/1935.* Darmstadt: L.C. Wittich.
Rödiger, F., 1890. Vorgeschichtliche Zeichensteine, als Marchsteine, Meilenzeiger, Wegweiser, Pläne, und Landkarten. *Zeitschrift für Ethnologie* 22, 504–16.
Rödiger, F., 1891. Vorgeschichtliche Kartenzeichnungen in der Schweiz. *Zeitschrift für Ethnologie* 23, 237–42.
Rosellini, I., 1834. *I Monumenti Dell'Egitto e Della Nubia*. Pisa: N. Capurro.
Schackenburg, H., 1903. *Schack zu Das Buch von den Zwei Wegen des Seligen Toten (Zweiwegebuch)*. Leipzig: Text Nebst Einleitung.
Schönfeld, M., 1921. L'astronomie prehistorique en Scandinavie. *La Nature* 2444, 81–3.
Schütte, G., 1920. Primeval astronomy in Scandinavia. *Scottish Geographical Magazine* XXXVI, 244–54.
Shih-yung, C., 1976. Some data on the ancient maps for Ma-wang-tui and on several Han seals. *Wen-wu* 1, 28–32.
Speck, F.G. & L. Eisley, 1942. Montagnais-Naskapi bands and family hunting districts of the Central and Southeastern Labrador Peninsula. *American Philosophical Society Proceedings* 85, 215–42.
Stahl, W.H., 1960. Cosmology and cartography, in *Encyclopedia of World Art*, vol. 3. New York (NY): McGraw-Hill.
Thrower, N.J.W., 1996. *Maps and Civilization: Cartography in Culture and Society*. Chicago (IL): University of Chicago Press.
Tobler, A.J., 1950. *Excavations at Tepe Gawra: Joint Expedition*

of the Baghdad School and the University Museum to Mesopotamia, 2 vols. Philadelphia (PA): University of Pennsylvania Press.

Trump, D.H., 1979. *I primi architetti: I costruttori dei templi Maltesi.* Rome: Giorgio Bretschneider.

Tschudi, J., 1955. *Pitture rupestri del Tasili degli Azger*. Florence: Sansoni.

Turnbull, D., 1989. Maps are territories: science is an atlas, in *Nature and Human Nature*. Geelong, Victoria, Australia: Deakin University Press, 1–66.

Unger, E., 1935. Ancient Babylonian maps and plans. *Antiquity* 9, 311–22.

Unger, E., 1937. From cosmos pictures to world maps. *Imago Mundi* 2, 1–7.

Viragh, D., 1965. A legregibb terkep. *Geodezia es Kartografi*a 18(2), 143–5.

Zammit, T., 1930. *Prehistoric Malta: the Tarxien Temples*. London: Oxford University Press.

Chapter 14

Mind and Artefact: a Dialectical Perspective

Robert A. Hinde

All humans operate in a world limited by their sensory capacities, which is therefore not the same as the world 'out there'. Within sensory constraints, each individual elaborates a 'psychological world' as a consequence of interaction with others. The psychological worlds of individuals are likely to overlap extensively, in part because they depend on pancultural psychological characteristics and on experiences which have much in common between individuals. More importantly, we strive actively to maintain congruence with the psychological worlds of others. The principles underlying the dialectical relations between individuals and current cultures are likely to be helpful in understanding past cultures; and the principles underlying our interactions with each other can throw into relief some aspects of how we interact with artefacts.

Archaeology involves exploration of territories that can never be fully mapped, and discussion as to whether even a sketch-plan is possible has been continuous (Wylie 1993). Much of the current debate reduces to the allocation of primacy — to the artefact, as part of the external world, or to the minds of its creator and of the archaeologist who tries to discern its significance. Often it is a debate between supposed scientific objectivity on the one hand and an emphasis on the subjective aspects of our understanding of the world on the other. To one who is outside the debate, neither extreme view seems either acceptable or productive. An implication that we have direct access to a 'real world' seems to neglect basic issues in psychology and physiology, while acceptance of idiosyncratic subjectivism runs counter to the facts of evolution and of developmental and social psychology.

The suggestion that archaeological interpretations are largely subjective raises two issues. First, do individuals agree in their interpretations of artefacts? Second, if so, do the interpretations of modern observers accord with the significance that the artefact had for its makers and users? It is suggested here that, while there is a sense in which all individuals construct the worlds in which they live, the way in which they do so ensures a large overlap in their subjective worlds, and it is even reasonable to suppose that modern minds can gain considerable insight into the relations between individual and artefact in past cultures. To that end, some comparisons between the ways in which individuals relate to each other and the ways in which individuals relate to artefacts may be helpful. Consideration of these issues may make it easier to steer a course between over-simplistic and obscurantist discussion.

Sensory and perceptual constraints and predispositions

The first point is certainly not new, but perhaps deserves to be underlined in the present context. In the absence of artificial aids, all humans operate in a world that is not identical with any world that there may be 'out there'. We can only respond to and describe those aspects of the world to which we are sensitive. We have words for colours within the visible spectrum, where we can discriminate them, but not for divisions of the infra-red or ultra-violet spectrum simply because we are not sensitive to them. This issue is not a trivial one: the 'world out there' affects us only so far as we are sensitive to it.

Renfrew (this volume) points out that 'the possibility of weighing has to arise from experience with the artefacts of the real world', but one must add that our 'real world' depends on our sensitivities. We would not have devised balances if we were not sensitive to differences in weight. An *Octopus* society would never do so because, although well able to learn to discriminate textures, *Octopus* seem unable to learn to discriminate objects by weight (Wells 1961). The sensory and perceptual characteristics of our species are important determinants of our artefacts, which are made to be useful, conspicuous, or distinctive (Rawson 1992). And a similar principle applies also to our motor abilities: a scraper must be neither too small nor too large to hold.

Within the physical dimensions to which we are sensitive, we operate within a subjective world that is a consequence of both our nature and our experience. In the first place, there are some sensory configurations to which we are especially sensitive: regular figures, for instance, are more conspicuous than irregular figures. And some stimulus configurations elicit particular responses: for instance a touch on the side of the cheek of a neonate elicits head-turning towards the point of stimulation — part of the sequence that leads to nipple contact and sucking. A rapidly enlarging visual stimulus elicits withdrawal from older individuals, and certain stimulus configurations elicit parental or sexual motivation. Furthermore, by virtue of our nature we are attracted to some aspects of the external world more than to others. A toddler endeavours to stay near his or her parent, and eight-year-olds shown pictures of environments of different kinds show a clear preference for savannah (Kaplan 1992), an environment believed to have been especially favourable for early humans. This selectivity in responsiveness, this way in which 'things stand out from the background of undifferentiated worldhood', as Thomas (this volume) puts it, is not a uniquely human characteristic, but a feature of all organisms.

All this is because we have evolved to be sensitive to, and to respond to, the things that matter to us. Natural selection has also operated so that we are predisposed to learn some things more than others (Seligman & Hager 1972; Hinde & Stevenson-Hinde 1973), language being an obvious example. Human infants are equipped with, or rapidly acquire, knowledge of aspects of the physical world — that solid objects cannot pass through each other (at 4 months) or that unsupported objects fall downwards (at 6 months). They are also equipped with, or rapidly acquire, knowledge about categories in the external world — the difference between animate and inanimate objects, for instance (Karmiloff-Smith 1992; Spelke 1990; Sperber *et al.* 1995).

The elaboration of the 'psychological world'

As a consequence of differences in nature or circumstances, however, the experiences of every individual differ from those of others. Children come to direct their behaviour to some individuals rather than others, and to prefer the environment in which they live to savannah. While our sensory and perceptual abilities are effectively pan-cultural, through differences in nature and experience each of us constructs a psychological world that is in some degree idiosyncratic. To say that we 'construct a psychological world' is, of course, a metaphor. It implies that for all of us the world to which we respond is not exactly the same as any world which may exist out there, and furthermore each of us has perceptions and associations that differ in some degree from those of others. The detail of our psychological worlds depends for each of us on our own experience.

But this does not mean that we all live in separate subjective worlds which cannot be reconciled with each other: in practice they are very similar. This is not only because our sensory and perceptual capacities are very similar, nor just because we all have many aspects of experience in common. There is another more positive reason why we all tend to see the world in a similar way. It is in our nature (for obvious adaptive reasons) to try to achieve a feeling of security and coherence, of being in control, and we can achieve that the more readily if our psychological world is compatible with those of others. We attempt to validate our view of the world by comparing it with those of others, and if there is a discrepancy, we are likely to change our own view or to attempt to change theirs (Backman 1985). We construct our worlds individually, not collectively (contrast Thomas this volume), but in doing so we are strongly influenced by how others construct theirs. The more our perceptions of the world coincide with those of others, the more willing we are to accept them as true. This is especially the case with views that are unverifiable (Byrne *et al.* 1968), such as those that concern an after-life. Searle (1995), writing as a philosopher, reaches a basically similar view — namely that External Realism is a pervasive and essential 'Background presupposition' on the normal understanding of a very large class of utterances.

A large degree of commonality in the psychological worlds of the members of any given

society, and agreement on many issues, is thus to be expected. Our unverifiable beliefs, and many of our values and institutions, do however depend on a degree of consensus amongst the members of the society in which we live. Each of us is socialized into a particular culture and finds other cultures difficult to understand. Does that make it impossible for archaeologists, even though agreeing among themselves, to be anywhere near the mark in reconstructing the significance of artefacts for their makers and users?

Here it is important to remember that neither societal structures nor cultural environments are givens: just as individuals construct their psychological worlds, so do groups of individuals construct and maintain their societies and cultures. Each human society is not a static entity: it is continuously being created, maintained, changed and discarded by the activities of individuals striving to satisfy their needs to eat and drink and procreate, to perceive coherence in the world, to have some sense of control. And in all their diversity, societies depend on dialectical relations with the same basic human propensities or 'Relatively Stable Characteristics' (Hinde 1991), and these are at least in continuity with those of the members of earlier societies. This is not to deny cultural complexity, for any one cultural feature may have many determinants: incest taboos may have a diversity of both social and biological inputs. But the different aspects of a culture tend to have some (though incomplete) coherence: for example, attitudes to women seem to have some relation to the gender of the deities (Williams & Best 1982). And all societies depend and have depended on very similar propensities in diachronic interaction with their social and physical environments. The archaeologist is entitled to the same assumption as the anthropologist engaging in participant observation — that the culture under study has been shaped by propensities identical with or at least very similar to those that shaped his or her own.

For understanding the natures of the cultures he or she studies, the *principles* underlying the dialectical relations between individuals and current cultures are more likely to be helpful to the archaeologist than comparison of particular past cultures with particular current ones. Abstracting such principles from the wide spectrum of current societies provides a powerful tool for understanding other societies. They bring the archaeologist nearer to the position of the participantly observing anthropologist. Such an approach is facilitated by those studying the role of artefacts in modern societies (e.g. Halle this volume) and, though not explicitly stated, is in fact the course adopted by some working with moderately complex past societies (Rawson this volume). Of course, this approach may become somewhat less reliable the earlier the society under study, but modern minds can get at least some insights into 'ancient minds' on the basis of their artefacts, even if that insight is limited. This is especially the case if the aim is primarily to find out how artefacts were used, rather than every shade of meaning attached to them (Renfrew 1994). And, as Wylie (1982; 1993) emphasizes, interpretative options can be systematically evaluated on substantive, evidential grounds, with the possibility that they can be rejected.

As a small contribution to this procedure, comparison with the manner in which we interact with each other may throw into relief some aspects of how we interact with artefacts, and thus on the significance of artefacts in past cultures.

The social world and the sense of self

We live in an essentially social world. Our personality is shaped by the social experiences we have had: we are changed as a consequence of interaction, and we change those with whom we interact. Interactions are shaped by the past history of interactions. One's sense of self depends on the social environment one has experienced: the sort of person one sees oneself to be is determined in large measure by the relationships one has had with others. And each relationship is special, with its own meanings, associations, memories and expectations. Thus individuals describe themselves in large measure in terms of the relationships and interactions that they have with others — as 'getting on well', 'having few friends', 'generous', 'shy' and so on (Fletcher & Fitness 1996). The self also comprises the norms and values that we have acquired from social contacts in the culture in which we live.

Psychologists describe this metaphorically by saying that the self-system is made up in part of one's relationships with others. Those others, and the relationships with them, are incorporated into the self. Some psychologists and psychiatrists write of the formation of 'Internal Working Models' of the self, others and relationships (Bowlby 1969); others of 'Self-expansion through relationships' (Aron & Aron 1996). Strathern (this volume) uses a similar metaphor when she writes of 'persons having relationships enfolded within their bodies'. The use of metaphors is probably essential in this context, but they must be seen for what they are — a way to

come to terms with the complex dialectic between individual and social experience, a device to describe the ways in which we are influenced by and influence our experience (Hinde 1997).

We also see ourselves as part of a narrative which stretches back into the past and forwards into the future. This narrative can be seen as a diachronic extension of the Internal Working Model of the self referred to above. The narrative has some flexibility — we accommodate our story to assimilate new experiences and to achieve coherence with our view of ourselves and of the world (Holmberg & Veroff 1996). It is not unreasonable to suppose that the extension of our narrative into an imagined future assists planning and has therefore been adaptive, and that it may in turn lead to the preoccupation of humans with an after-life.

Individuals and artefacts

The role of objects in our lives is in some ways comparable to the role of people, and it is possible to see much of the work discussed in this volume in terms of a similar dialectic between person and artefact. In general, the nature of an artefact depends on aspects of the physical world (e.g. the material from which it is made), on the characteristics of the individual who made it or for whom it was intended, and on aspects of history and fashion — a conclusion reached independently by Hinde & Barden (1985) in a study of the physiognomy of Teddy Bears and by Rawson (1992) writing about the decoration of Chinese bronzes. An artefact is made for a purpose, but in use acquires further associations and meanings in addition to that initial purpose, and the processes associated with this are very similar to those involved in interpersonal relationships.

Just as how we see ourselves is changed by our interactions and relationships with others, so also is it changed by the artefacts we make and use. Just as having a friend can change our whole orientation to the world, so do the objects that surround us. Indeed, we may choose our clothes and possessions so that we are able to present ourselves to the world as we would wish. Just as people's self-descriptions are much influenced by their relationships, individuals have been shown to describe themselves differently according to the environment that they are in (McGuire & McGuire 1988), and common experience suggests that they describe themselves differently according to the artefacts that are present. An individual 'feels different' in church or temple, or on receiving a gift from a loved one. One could say that some artefacts become part of the self: a miser may become a different person if he loses his gold. And in using artefacts, or seeing them used by others, we change them, or at least we change their meaning for us in such a way that we, and perhaps others, respond differently to them in the future.

Just as our values are influenced by social contacts in our culture, so also are they influenced by artefacts — our possessions, or the cross in the church, to give two rather different examples. And just as our values affect our personal relationships, so do they affect our relations to artefacts: humans would never have invented balances if weight (or a correlate of weight) were not important to them.

Just as the narratives we elaborate embrace our own lives in relation to those of others, so also they embrace our lives in relation to the environment, including the artefacts that we have made and used. The impulse to go and see the house where one grew up, the treasuring of a childhood keepsake, have emotional concomitants, but they also provide physical confirmation of the narrative one has created, and whose coherence is essential to one's stability. Just as we reinterpret the narrative of our life according to how we perceive ourselves at the time, so the notches on the counting stick, the beads on the rosary or the figures on the VDU are interpreted according to the code in the head of the user.

Just as the myths which individuals incorporate are passed with minor modification from generation to generation, so may artefacts outlive the individual who made them (Strathern this volume), and serve to re-elicit behaviour or re-awaken images in descendants.

The associations and meanings of the god in the temple differ to some extent between individuals (Humphrey & Laidlaw 1993), and individuals may choose similar artefacts for their houses for different reasons (Halle this volume). Each one of us may 'construct' the associations of an object in somewhat different ways — a given artefact may have a different place in your psychological world from what it has in mine. But that does not render hopeless the task of the archaeologist in discerning the principal meaning of an artefact to those who made or used it. Although a ceremonial axe is a ceremonial axe in part because it is labelled as a ceremonial axe by those who used it (J. Heal pers. comm.), and may mean something different to emperor, priest and soldier, it can still be recognized as a ceremonial axe by its material properties and context, and this has implications about the culture in which it was used. In most cases the archaeologist may not be in a position to discover the meanings of artefacts to indi-

viduals, but can deduce their agreed significance in the society. And if time brings changes in the meaning of an artefact to its users, this may be revealed to the archaeologist by the context in which it is found (Rawson this volume).

One way of describing the reciprocal influences between individual and artefact is to say 'Mind, body and world are not ontologically different spheres' (Thomas this volume), and that must be taken as a challenge to unravel the dialectics involved. Social psychologists are making progress in understanding the dialectics between individuals and their relationships, and it is not unreasonable to suggest that a similar approach might be relevant to the dialectic between individual and artefact. In studying relationships, psychologists make use of metaphor, but they endeavour to do so in a way that opens new avenues for exploration, not one that obscures them. And the fact that idiosyncrasies of meaning may be beyond the reach of both social psychologist and archaeologist need be no deterrent to seeking more culturally-general answers: as Wylie (1982, 46) argues, archaeologists can meet the challenge of coming to terms 'with the cognitive, semiological and symbolic significance of their data'.

Acknowledgements

I am indebted to Colin Renfrew and Chris Scarre for allowing me to attend the conference on which this volume was based, and inviting me to make this contribution to the volume itself. The preceding discussion owes much to discussions with Dr Jessica Rawson, and I am indebted to her and to Dr Jane Heal for comments on earlier drafts.

Robert A. Hinde
St John's College
University of Cambridge
Cambridge
CB2 1TP

References

Aron, A. & E.N. Aron, 1996. Self and self-expansion in close relationships, in Fletcher & Fitness, 325–44.

Backman, C.W., 1985. Interpersonal congruency theory revisited: a revision and extension. *Journal of Social and Personal Relationships* 2, 489–505.

Bowlby, J., 1969. *Attachment and Loss*, vol. 1: *Attachment*. (2nd edition, 1982.) London: Hogarth.

Byrne, D., D. Nelson & K. Reeves, 1968. Effects of consensual validation and invalidation on attraction as a function of availability. *Journal of Experimental Social Psychology* 2, 98–107.

Fletcher, G.J.O. & J. Fitness (eds.), 1996. *Knowledge Structures in Close Relationships*. Mahwah (NJ): Erlbaum.

Hinde, R.A., 1991. A biologist looks at anthropology. *Man* 26, 583–608.

Hinde, R.A., 1997. *Relationships: a Dialectical Perspective*. Hove: Psychology Press.

Hinde, R.A. & L. Barden, 1985. The evolution of the Teddy Bear. *Animal Behaviour* 23, 1371–3.

Hinde, R.A. & J. Stevenson-Hinde (eds.), 1973. *Constraints on Learning*. London: Academic Press.

Holmberg, D. & J. Veroff, 1996. Rewriting relationship memories: the effects of courtship and wedding scripts, in Fletcher & Fitness, 345–68.

Humphrey, C. & J. Laidlaw, 1993. *The Archetypal Actions of Ritual*. Oxford: Oxford University Press.

Kaplan, S., 1992. Environmental preference in a knowledge-seeking, knowledge-using organism, in *The Adapted Mind*, eds. J. Barkow, L. Cosmides & J. Tooby. New York (NY): Oxford University Press, 581–98.

Karmiloff-Smith, A., 1992. *Beyond Modularity*. Cambridge (MA): M.I.T. Press.

McGuire, W.J. & W. McGuire, 1988. Content and process in the experience of self. *Advances in Experimental Social Psychology* 21, 97–144.

Rawson, J., 1992. Late Shang Bronze design: meaning and purpose, in *The Problem of Meaning in Early Chinese Ritual Bronzes*, ed. R. Whitfield. (Colloquies on Art and Archaeology in Asia 15.) London: School of Oriental and African Studies, 67–95.

Renfrew, C., 1994. Towards a cognitive archaeology, in *The Ancient Mind*, eds. C. Renfrew & E.B.W. Zubrow. Cambridge: Cambridge University Press, 3–12.

Searle, J.R., 1995. *The Construction of Social Reality*. London: Penguin.

Seligman, M.E.P. & J.L. Hager (eds.), 1972. *Biological Boundaries of Learning*. New York (NY): Appleton Century Crofts.

Spelke, E.S., 1990. Principles of object perception. *Cognitive Science* 14, 29–56.

Sperber, D., D. Premack & A.J. Premack (eds.), 1995. *Causal Cognition*. Oxford: Clarendon.

Wells, M.J., 1961. Weight discrimination by *Octopus*. *Journal of Experimental Biology* 28, 127–33.

Williams, J.E. & D.L. Best, 1982. *Measuring Sex Stereotypes*. Beverley Hills (CA): Sage.

Wylie, M.A., 1982. Epistemological issues raised by a structuralist archaeology, in *Symbolic and Structural Archaeology*, ed. I. Hodder. Cambridge: Cambridge University Press, 39–46.

Wylie, M.A., 1993. A proliferation of new archaeologies: 'beyond objectivism and relativism', in *Archaeological Theory: Who Sets the Agenda?*, eds. N. Yoffee & A. Sherratt. Cambridge: Cambridge University Press, 20–26.

Chapter 15

Material Culture and Cognition: Concluding Thoughts

Merlin Donald

Material culture probably played a seminal role in the initial formation of the human mind. Large-scale efforts at structuring the material environment, such as dwelling arrangements, graves, earthworks and monuments, as well as smaller artefacts, some symbolic, others primarily utilitarian, all played a part. They acquired meaning through their immersion in a rich matrix of custom, ritual, storytelling, and myth. This matrix, in turn, was framed, preserved and sometimes extended by material culture.

Material culture externalizes memory and greatly amplifies the permanence, and power, of distributed cognition. In advanced societies, external symbolic storage entails highly complex storage media that require extensive training of the young. Such training can actually change the operational architecture of cognition in the individual by influencing the developing brain. The continuing interplay between material culture and cognition creates new cognitive opportunities, changing how members of a society represent reality, both individually and collectively.

Material culture and the human mind have co-evolved, and this co-evolutionary process extends far back in time, perhaps two million years or more. Modern humans depend so heavily on material culture that the word 'symbiosis' does not seem out of place, yet cognitivists often seem unaware of the importance of this symbiosis, as fish are unaware of the sea. As Renfrew pointed out in his introductory paper in this volume, we are especially blind to those aspects of material culture that are not explicitly symbolic, such as the physical settings that surround us. Yet surely the most inclusive framework of material culture is its physical setting. It is the skeleton, as it were, on which the body of material culture is hung. Settlements, roads, site plans, structures, landscapes, earthworks, and other large-scale arrangements of the environment form the working framework, as well as the stabilizing anchor, for most of human social cognition.

Strathern's paper showed very clearly how the physical setting of a village reflects and transmits cultural knowledge in New Guinea. The plans of such villages are really shared analogue constructs that serve as shared cognitive maps. These constructs are 'stored' in the permanent organization of the village itself. For the most part, the symbolism implicit in a village plan shapes day-to-day social interactions, and serves as one of the foundation stones of local culture. Perhaps most importantly, it is also the basis for the acquisition of these same cognitive maps by subsequent generations. The village plan is thus transformed into a transmitter of cultural knowledge, serving as what some neo-Darwinians call a 'replicative' device, as well as a stabilizing force on the culture.

Another example of crafted physical settings was shown in Dowson's work on cave art. Although we can never acquire the same detailed documentation in such cases as Strathern was able to do from a living culture, it is nevertheless clear that similar forces were at work. These cultures shaped and embellished their living spaces with material structures and symbols. Those spaces in turn acted upon their creators, and shaped the individuals living in the culture in much the same way that the villages of New Guinea shaped their inhabitants. The richness

of cave art conveys the same strong image of the reciprocity of cognition and the physical setting of culture. Just as it does in living cultures, these two factors, the physical setting itself, and the cognitive map collectively held by the society, were constantly accommodating themselves to one another.

Larger physical settings are typically filled with a constant movement of smaller material items between families and individuals, equivalent in function, if not in detail, to the flow Strathern observed in New Guinea. She showed how the flow of smaller material artefacts follows an intricate pattern that mirrors relationships within the culture. How early did this pattern emerge? It is difficult to say with any certainty, but the finely-detailed artefacts of the Upper Palaeolithic that were described in detail by d'Errico might possibly fall into this category. His paper suggested that small crafted objects appeared early in sapient prehistory. Some of these objects seem to have been non-utilitarian, and may have had a primarily symbolic function. It will be important to try to determine whether these objects reflect a typically human hierarchical arrangement of material culture; that is, a flow-pattern of material objects within a larger crafted setting. Alternatively, their use might have been restricted to individuals, but that seems unlikely.

Strathern wrote that social relations make 'artefacts' out of persons, and drew a comparison between the symbolic functions of persons, viewed in this way, and external symbolic artefacts. This is an important point. All of human culture, including its mimetic and oral aspects, exists outside of the individual, or more properly incorporates and entangles the individual. Within that distributed cultural matrix, almost anything or anyone can be made to serve a symbolic function. Buildings can form a symbolic boundary, and so can personal acts, natural objects, or abstract maps. In that case, what is so special about external symbolic artefacts? Taken in that way, they may not appear to be special. They can serve functions that are similar to those served by personal acts, or objects such as buildings, and in fact they are often substitutes for such acts and objects.

But in another sense, external symbols are very special, and that is why I have placed such emphasis on the physical media from which symbolic artefacts are made. As I tried to make clear in Table 2.2, the various physical media of external symbols were crucial variables in the cumulative increase of their power over time, because the introduction of new media gradually freed the symbolization process from the limitations of biological memory, eventually leading to the possibility of radically novel symbolic formats such as ideographs, logographs, writing systems, monographs, geometric drawings, schematic diagrams, and mathematical notations. Persons can never store knowledge the way a novel or encyclopaedia can, in either a qualitative or a quantitative sense, and the main reason for this is the limited medium of biological memory storage. Crafted cues whose primary functions are non-symbolic, such as costumes, villages and houses, can certainly function symbolically, and undoubtedly served as important way stations during the third transition, but, by their very nature, they are not comparable in sheer representational power to later inventions, such as books and scientific diagrams. Nevertheless, they were the starting point of a revolution, and the only way to reconstruct that revolution is to trace their prehistory.

The habit of crafting the environment itself, as well as the smaller, more explicitly symbolic forms of material culture, to meet the social, practical and communicative needs of the group, is possibly the most salient marker of our distinctively human style of cognition. This remains true in modern human society, where our material culture sometimes threatens to overwhelm us with its richness. Individuals are surrounded by a sea of symbols and artefacts. The conventions regulating their uses are complex and subtle, and individuals often employ material culture in idiosyncratic ways. Halle's paper explored how certain cultural objects are actually used by people in modern society, and he demonstrated something that is often overlooked in studies of symbols, that the rules of use are far from rigid and formal, and at times appear irrational in the extreme. Archaeologists and psychologists might both gain an important clue from his study of the mundane uses to which humans put their material culture. There is clearly a wide continuum of formality, ranging from the state-enforced ritual uses of formal religious art and architecture, to many personal use-patterns that are rather more casual. The latter have probably not changed very much over time, despite the much greater size and complexity of material culture in technologically sophisticated societies. Even in modern society, some of the apparently 'symbolic' uses of material culture are governed by irrational, largely mimetic principles.

Conformity and mimesis

There may be a tendency among highly literate academics to place inordinate stress on the role of

formal languages and symbols in human culture. This reflects an aspect of modern social reality, but not necessarily the more basic principles that rule human cultures. I do not deny the dominant role that language-based symbols have played, but the roots of human culture run far deeper than our language-based cultural institutions. In my view, human culture is primarily mimetic in its origins. It is more deeply rooted in non-verbal cognition and communication than it is in language. This principle extends, I believe, to many of the uses of material culture, including some of its earliest forms.

Among other things, our powerful mimetic skills make us conforming creatures. The pressure to act and think like others, and to become identified with groups, is overwhelming. It is thus perhaps not surprising that we commonly use aspects of material culture to enforce conformity and group identity. Kinship emblems, village plans, dress and body decoration conspire to impose a social order. This is a cultural universal. Even modern scientists, who (without exception in my experience) believe themselves to be 'individualists' are in fact strongly conditioned to behave one way in the seminar hall, another in the street, and another in various private settings. Facial expression, body language, and actions are closely controlled by these settings. So, to an alarming extent, are thought and gesture. The slightest deviation from an unwritten, and highly complex, code of dress, voice, action and gesticulation will be picked up anywhere, whether on the street or in academe itself. Even Cambridge, famous for its eccentrics, will accept only those who conform to its unwritten codes. The codes that regulate thought and association are also narrowly cued by specific settings — pubs, High Tables, libraries, laboratories, classrooms, hotels, houses. These settings call up what computationalists call 'scripts', or sequences of behaviour appropriate to them. Thus there are scripts for 'participating in a seminar', 'working in the library', and 'eating at High Table'. These define what is possible in each setting. To be truly a part of Cambridge, we must acquire the appropriate scripts, just as children must acquire languages.

The most universal of these scripts are acquired early in life, mediated by the mimetic processes so beautifully described by Harris. Certainly, such processes as full-body re-enactment, shared pretending, and imaginative displacement allow modern children to acquire an initial understanding of their culture, including some of its material aspects. This understanding is later greatly enlarged through the mediation of language, but the mimetic dimension remains fundamental, and to some degree, independent. Although, as Harris has observed, mimesis and language may normally develop in synchrony with each other, mimetic skills have been observed in nonsigning deaf people, where there is no possibility of language mediation. Moreover, mimesis and language operate by different principles, the former by iconicity and analogy, the latter by explicit description and explicit denotation of relations.

Even today, the uses of material culture more often than not reflect these 'irrational' mimetic forms. The universal presence of fashion, music, custom, and ritual in popular culture, so apparently subversive of more formalistic and rational cultural institutions, testifies to this. Although apparently easy to acquire when young, such conventions are often difficult for adults — more difficult than languages, a lesson that many Western executives and diplomats have learned the hard way.

In summary, material culture acquires its meaning through immersion in a rich cognitive-cultural system, and the fundamental cognitive 'glue' that holds this system together is mimesis.

External memory

External memory, as a general rule, is a direct extension of the larger cognitive-cultural system that generated it. But material culture, broadly defined, has marked hominid society for a very long time, whereas I have placed the 'third transition' in human evolution squarely within the era of sapient humans. Is there perhaps a contradiction here? If not, when did hominid material culture suddenly and miraculously start to qualify as 'external memory'? Does this term apply only when the symbolism of material culture is explicit? Or does it apply to the crafted environment, including the physical setting, which, as we have seen, can be implicitly symbolic? What, for instance, about the subtle, quasi-symbolic influences of the site plan? Do such things qualify as bona fide 'external memory'?

I now realize that I have not addressed this question as thoroughly as I should have, and I am grateful to archaeologists for pointing that out to me. I think I have already hinted at a possible answer: there is nothing magical about external symbols, and no clear-cut break between non-symbolic, non-intentional aspects of material culture, such as the earliest stone tools, and obviously symbolic aspects, such as systems of notation whose utility as memory devices is explicit. Apes can learn to use external symbols, and they do not thereby change

their basic cognitive abilities, even though symbols may release a number of latent skills. Their uses of symbols reflect the kinds of 'mental models' that apes are able to produce. When they master a set of symbols, they do not suddenly start to think like humans. The point is that external symbols can only be used to enhance and extend basic capacities that are already in place.

The same principle applies to humans. In the course of evolution, hominids acquired two kinds of mental capacity that apes cannot match: mimesis and language. Predictably, the external symbols invented by humans exploit those two uniquely powerful human capacities. Other aspects of material culture also exploit these special capacities, but they cannot change human nature, or the basic capacities of humans. The significant change came with the transition from casual or implicit material influences, such as may be found in those aspects of material culture that are not explicitly symbolic, to full-fledged external symbols. External symbols have become a very powerful transforming force in human life, and have altered the cognitive landscape, precisely as they became more potent storage devices, capable of storing much more explicit and highly detailed knowledge.

When did this transformation begin? As d'Errico pointed out, when it comes to decoding the earlier stages of human prehistory, we are left with only a few artefacts that might qualify as 'true' symbols. Moreover, whatever artefacts might survive his rigorous initial screening lack the codes and conventions that must have informed their use. Unfortunately, the external symbols themselves never contain enough information to allow us to rediscover the detailed thought-habits of an ancient culture *a posteriori*. Symbolic artefacts, even of the more elaborate kind, rarely encode the conventions governing their use, with the possible exception of some mathematical systems.

This makes it very difficult to reconstruct the earliest period of symbolic prehistory, which includes most of the Upper Palaeolithic. D'Errico gives us a hint of one possible means of resolving this issue. By analyzing carefully the construction of these very early artefacts, one might be able to infer their use-patterns, and possibly the type of construction plan in the mind of the person who made them. This might permit a generic re-classification of these artefacts, and might well yield a new conceptual framework within which not only very ancient, but even more recent artefacts can be placed in a conceptual hierarchy.

Some delegates, for instance, Lowe and Thomas, came to this conference with the intent of focusing exclusively on the 'storage' functions of external symbols. But, in my view, adhering too closely to such a literal interpretation restricts discussion unnecessarily and tends to distort my theory. (Thomas in particular misread me as a computationalist, which I most emphatically am not.) I have never placed a literal interpretation on the title of this conference, but some have taken my terminology literally, as if the term 'external symbolic storage' were meant to exhaust all the functions of external symbols. In fact, this goes completely against the grain of my thinking. The 'storage' function of symbols cannot be isolated from their other functions, nor from the minds that use them. Above all, they are a testimony to the public creative processes that invented them in the first place.

When I coined the term 'external symbolic storage', I was simply singling out the most salient and indisputable property of material culture: it exists only in relation to interpretative codes stored inside the heads of the people who invented it, that is, inside their 'biological' memory systems. Written symbols, and even other less explicitly symbolic aspects of material culture, are external to biological memory, and serve as storage devices for the information needed to replicate entire cultures. This simple fact changes the nature of shared cognition. But it also makes the archaeologist's job very difficult, because the specific content of symbols can never exhaust their functions when in use. When in use, symbols engage biological memory, which is a creative, constructive, dynamic, force. Symbols and cognitive artefacts are thus drawn into a maelstrom of shared cognitive activity in any culture. Artefacts are static things, and undoubtedly serve as static storage devices, but their functions in the larger cultural matrix go well beyond mere storage, because they are in dynamic interaction with the entire cognitive-cultural system in any living culture.

Regarding Lowe's notion that symbolizing capacity depends upon a uniquely human form of conceptualization and classification, I cannot agree. In the last few years our view of the minds of what he calls the 'lower animals' has been somewhat revolutionized. This is especially true of chimpanzees and bonobos, but it also applies to other species that are genetically quite far from the primate line, such as dolphins and parrots. Many species have the ability to use symbols, and use them intelligently. Pepperberg's parrot comes to mind. When confronted with a choice of various coloured objects, and asked: 'Which is the yellow one?'; he answers correctly, 'banana'. It seems that even a parrot can conceptually isolate the colour from the form of an object, and realize (only implicitly, of course) that objects can simultaneously

come under various conceptual hierarchies (Pepperberg & Brezinsky 1991; Pepperberg 1992).

The same is true of primates. Premack (1976) showed that chimpanzees can master visual symbols that represent abstract concepts such as 'same as' and 'different from', and are able to answer a variety of questions, some fairly abstract, using this skill. As I pointed out at some length in my (1991) discussion of symbolic invention, we should not read too much into this; but we should not underestimate this achievement either. Savage-Rumbaugh and her colleagues (1993) have demonstrated convincingly that Kanzi, their star bonobo pupil, can do far more than conceptualize objects and their relations. He can segment the speech stream into words, parse simple reversible English sentences, and use hundreds of visual symbols to communicate, not only with humans, but also with other bonobos (although the latter occurs only under highly structured conditions). Kanzi is also able to manufacture (and correctly use) simple stone tools and play simple computer games. His symbolic talents far exceed anything we might have predicted a decade ago. Humans are undoubtedly unique in their spontaneous invention of language and symbols; but, as I have argued elsewhere (Donald 1997; 1998a,b) our special advantage is more on the production side than on the conceptual side of the ledger. Animals know much more than they can express. We can come closer to expressing what we know, because of a revolution in our ability to apply our knowledge in the control of action, whether in speech, gesture, or re-enactive pantomime.

The cultural context

All this is thrown into sharp relief when archaeologists and anthropologists confront us with cultures that fall outside our direct experience. I was very struck by Rawson's paper, which showed how symbols, sacred objects, and ritual were employed in the immensely complex matrix of custom that encompassed the whole fabric of Chinese classical civilization. To understand the function of a ceremonial knife in that society, it is clearly not enough to describe the object itself, although it is perhaps the only way to start. A knife may indeed serve a storage function, perhaps to cue a ritual behaviour, convey either acceptance or some other form of social recognition, or to facilitate a certain kind of reflection, but its cognitive utility is rarely, if ever, restricted to its storage function.

Above all, the symbolic value of any artefact is not always evident in its appearance. The same object may have several functions, and several layers of symbolism in different times, places, and social classes, in the same society. It is only a node in a dynamic social-cognitive system. The system itself defines the role of such objects. It creates, changes, and enforces their precise functions. True, the objects themselves serve a storage function. But to know what symbols and artefacts store, and what kinds of specific cognition they might support, we must know a lot about the culture, and the mind, that uses them. In this I am in full agreement with Renfrew.

In the absence of that kind of detailed knowledge, the only available strategies for reconstructing hominid prehistory are interpolation, based on primate–human comparisons, and extrapolation, based on what is known about the uses of material culture in existing societies. Used cautiously and in a principled manner, these strategies can yield rich insights. I think that Mithen's attempt to recreate human prehistory in cognitive terms is laudable, even though I disagree with many elements of the specific theory that he has proposed, particularly his reading of the domain-specificity literature. But he has at least acknowledged the complexity of the problem, and given more time, we should be able to build better reconstructions.

Many previous accounts of human prehistory have tended, in the interest of doctrinaire reductionism, to oversimplify the magnitude of the cognitive steps that early hominids had to take to arrive at our current cognitive and cultural state in two million years. There are still many theorists who resist the idea that hominids really travelled so far so fast, and who insist on oversimplifying the problem, usually, in my opinion, by greatly underestimating the capabilities of early humans. A few more efforts like those of Mithen, and perhaps these oversimplifications will be seen for what they are.

Renfrew has suggested, in this vein, that perhaps we should interpose an additional transition in my scenario, one that effectively distinguishes between certain Neolithic material cultures that have many of the forms of modern symbolic culture, with the notable exception of writing, and those cultures that also have writing. This distinction could prove quite useful. Although writing was undoubtedly the most powerful symbolic invention, and the one that started us on the road to modernity, there is a great deal more to external symbolic representation than writing, and writing eventually changed the rules by which symbols were used. Many cultures that completed the transition to food production, and had large permanent settlements, monuments, highly

crafted possessions, emblems, and many markers of identity and possession, could be said to form a symbol-using category of their own.

Others mentioned that it might prove useful to introduce other additional transitions, micro-transitions as it were, to recognize some of the finer distinctions between different types of symbolic cultures. Rawson proposed that theoretic culture should perhaps be dissected into subphases and subcategories, and elsewhere, Egan (1997) has made a similar suggestion regarding mythic culture. Of course, Renfrew, Rawson and Egan have their own agendas, and as soon as we abandon my neurocognitive position, there may well be good reason to make these finer distinctions.

However, in defence of my three-transition scenario, I should say that it was a fairly revolutionary act to introduce even a single nonbiological evolutionary transition into what was, after all, a primarily biological scenario. I chose to introduce a third transition not so much to develop a refined tool for cognitive archaeology and anthropology (although that is an admirable objective in itself) but to point out to neuroscientists and psychologists that culture is a major player in shaping the mind, not in a trivial way, but in the psychologically fundamental sense that it actually alters our cognitive architecture. It gives the human mind much of its adult shape and power. My criterion for categorizing the modern symbolic era as a full-fledged 'transition', equal in importance to the two cognitive adaptations that shaped the early hominid mind was that it also triggered an architectural change in the human cognitive apparatus.

This change shows up in two ways. First, internally: symbolic literacy, once it reaches a certain level of complexity, alters our internal modular brain organization. This alteration is imposed by cultural reprogramming of axonal and synaptic growth during some of the key periods of neural epigenesis. Second, externally; symbolic cultures alter the externally distributed, or shared, architecture of cognition, introducing some very powerful properties into the external memory system. This change took considerable time — at least several thousand years — before it had an impact on how we think, but the end-result has been a period of unprecedented cultural innovation, with some completely new forms of representation. While it is true that most of this change occurred after the initial invention of writing, the process actually started long before writing, and long before the arrival of the High Neolithic societies that Renfrew singles out for different treatment. The external symbolic juggernaut has not yet settled into equilibrium, and continues to spin off new cognitive and cultural forms. For this reason, I still find it useful to classify the historical unfolding of external symbols as a single event, at least for the purpose of describing changes in psychological structure. I willingly conceded, that, for the advancement of cognitive archaeology, a different, and finer-grained, classification of material cultures might be justified.

We should not, however, aspire to more precision than the data justify. Material culture is multidimensional in its function, and unlikely to blend easily into a neat, communication-engineering model of cognition, in which every functional subsystem is clearly delineated, and every symbol given an unambiguous definition. Accordingly, I have tried to avoid such models. Unlike the narrowly-defined symbols and algorithms that drive digital computers, human physical culture exists in a community of 'fuzzy' minds that tolerate, indeed thrive on the ambiguity, subtlety, and perversity of human life. Many of the external symbols invented by human culture reflect this fuzzy or analogue thinking strategy. The fascinating ancient maps reviewed by Zubrow are typical of such symbols, since they follow a principle of perceptual and action-metaphor, reflecting 'pictorial' and 'ideographic' modes of visual representation that are essentially analogue in style, and highly diverse in their vernacular. These kinds of sophisticated symbols seem to have come much later, long after humans evolved language, but they still operate primarily according to a mimetic organizational principle, which is the most fundamental level of human representation.

Lake's paper raised Dawkins' concept of 'memes', and the question of Darwinian cultural transmission theory. This is an interesting theoretical approach, certainly worth exploring, albeit with great caution. Dawkins' idea is a dangerously attractive meme in its own right, in my view. It is an oversimplifying notion thought up by a geneticist as a way of 'explaining' cultural evolution without engaging in any psychology. This is why sociobiologists love memes — they can continue to avoid the complexities of psychology and physiology, as they always have. Dawkins' idea is simple enough: find the elementary cognitive units in any culture that self-replicate, and hang the details; all you need is the theory of natural selection. Ideas and customs, like genes, are in constant competition for survival. Some memes self-destruct quickly, while others prosper for thousands of years. All that remains to be explained is their adaptive value; that is, the reasons why certain memes survive, while others die out. This is achieved

by a *post hoc* process of reasoning.

Unfortunately, this approach leaves out all the details, and, as the saying goes, the science is in the details. Memes, whatever their form, are intentional representations. To understand them, we must discover what they are, in terms of basic cognitive processes. The primary motive behind my own theoretical work has been to answer that question. Until we know the answer, we cannot know what memes are, how they emerged, how they are transmitted across generations, or how they tap into pre-existing cognitive domains. Some neo-Darwinians don't even ask these questions, but hopefully archaeological explorers such as Lake will.

It is a chastening thought for a psychologist to realize that material culture provides the context for virtually all modern higher cognition. In our society, material culture appears as an overbearing force, so much so that one might be tempted to regard the individual mind as diminished by it. But we cannot have a science of mind that disregards material culture. Similarly, we cannot have an adequate science of culture, whether ancient or modern, that leaves out cognition. Despite the explosion of material culture in our times, the individual mind remains its source, interpreter, and final arbiter.

Merlin Donald
Department of Psychology
Queen's University
Kingston, Ontario
Canada
K7L 3N6

References

Dawkins, R., 1986. *The Blind Watchmaker*. London: Penguin.

Donald, M., 1991. *Origins of the Modern Mind: Three Stages in the Evolution of Culture and Cognition*. Cambridge (MA): Harvard University Press.

Donald, M.W., 1997. The mind considered from a historical perspective: human cognitive phylogenesis and the possibility of continuing cognitive evolution, in *The Future of the Cognitive Revolution*, eds. D. Johnson & C. Ermeling. Oxford: Oxford University Press, 355–65.

Donald, M.W., 1998a. Preconditions for the evolution of protolanguages, in *The Descent of Man*, eds. M.C. Corballis & I. Lea. Oxford: Oxford University Press, 120–36.

Donald, M.W., 1998b. Mimesis and the Executive Suite: missing links in language evolution, in *Approaches to the Evolution of Language: Social and Cognitive Bases*, eds. J.R. Hurford, M. Studdert-Kennedy & C. Knight. Cambridge: Cambridge University Press, 44–67.

Egan, K., 1997. *The Educated Mind*. Chicago (IL): University of Chicago Press.

Pepperberg, I., 1992. Proficient performance of a conjunctive, recursive task by an African Gray Parrot (*Psittacus erithacus*). *Journal of Comparative Psychology* 106, 195–305.

Pepperberg, I. & M.V. Brezinsky, 1991. Acquisition of a relative class concept by an African Gray parrot (*Psittacus erithacus*). *Journal of Comparative Psychology* 105, 286–94.

Premack, D., 1976. *Intelligence in Ape and Man*. Hillsdale (NJ): Erlbaum.

Savage-Rumbaugh, E.S., J. Murphy, R.A. Sevcik, K.E. Braake, S.L. Williams & D. Rumbaugh, 1993. *Language Comprehension in Ape and Child*. (Monograph 58.) Chicago (IL): Society for Research in Child Development.