

## Interacting ideas

Michael Rugg

**The Brain Code: Mechanisms of Information Transfer and the Role of the Corpus Callosum.** By Norman D. Cook. Methuen: 1986. Pp.256. £30, \$35.

THE discovery of a single principle which brought order to the apparently horrendous complexities of the workings of the brain would, to put it mildly, be very welcome. The "brain code", according to Norman Cook, is such a principle, and is exemplified by the way the two cerebral hemispheres interact via their largest interconnecting fibre tract, the corpus callosum.

Racing through such topics as comparative anatomy, the evolution of intelligence, and the nature of sensory representation and processing in the cortex, Cook derives and enlarges upon his "inhibitory topographical mapping" theory of inter-hemispheric communication. This theory is based on the twin assumptions that the corpus callosum interconnects homotopic cortical columns, and that the fundamental mode of action of this structure (with the exception of fibres interconnecting sensory cortices) is inhibitory. Activation of a cortical column in, say, the left hemisphere gives rise to inhibition of a homotopic column on the right side, but to excitation of immediately surrounding columns because of release from "surround inhibition". The upshot is that for any pattern of cortical activation on one side, a complementary pattern (likened to a photographic negative) will be observed on the other. This principle of cortico-cortico communication is the "brain code", and is considered by Cook as likely to be as fundamental to neuropsychology as the interaction between DNA and RNA is to biology.

Despite its scope, numerous high-quality illustrations and commendably clear style, this is not a textbook; areas of controversy are frequently discussed with virtually no reference to original work, and there are many minor errors of fact and occasional howlers (as in the statement on p.162 that Wernicke's area is located in parietal, rather than temporal, cortex). The book therefore stands or falls on its theoretical contribution. This, unfortunately, stems from a highly selective review of the literature on hemisphere specialization, and a naive conceptualization of how psychological functions are represented in the brain. For example, understanding a word is assumed to occur via excitation of a single cortical column corresponding to the word's denotative meaning in the left hemisphere, and, in the right hemisphere, excitation of a population of columns surrounding the

inhibited homotopic column to provide the connotative meaning. This theory is at variance both with observations of the way word meanings are lost following brain damage, and with the currently popular idea that at least some cortical areas act as parallel distributed systems in which information is represented in a spatially diffuse manner.

Cook quite correctly points to the importance of explaining how the two hemispheres interact to produce a single functional system. While criticizing others for falling back on simplistic dichotomies to characterize the different psychological functions of the two hemispheres, however, he proposes one himself, using the metaphor of an "executive" left hemisphere acting under the supervision of a "board of directors" in the right hemi-

sphere. He further argues that the respective abilities of each hemisphere are an important factor in determining personality differences between individuals, and are amenable to psychometric measurement. Such ideas have been the subject of trenchant criticism, on both conceptual and methodological grounds, from J.G. Beaumont and colleagues (*Cog. Neuro-psychol.* 1, 191-212; 1984).

It seems doubtful that *The Brain Code* will achieve its highly ambitious goal. But its directness and clarity highlight our ignorance of many aspects of brain function, and will force readers to examine their own assumptions about the subject. □

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## Analysing the past

R.E.M. Hedges

**Current Scientific Techniques in Archaeology.** By P.A. Parkes. Croom Helm, London/St Martin's Press, New York:1986. Pp.271. £30, \$35.

THE HISTORY of the application of scientific techniques to archaeological questions is a fascinating one, and starts at least as far back as Sir Humphry Davy's analysis of the mysterious pigment 'Egyptian Blue'. Ancient authorities, from Pliny on, pronounced upon its supposed composition, and recent publications from the British Museum Research Laboratory on the same material show that Sir Humphry has not had the last word.

In one sense, scientific analysis does no more than extend the judgements we all make, as between stone and metal artefacts, for example. It then falls to archaeologists to divide these objects into categories, for instance of Stone or Iron Age, or, to be more up to date, Hunters or Pastoralists. But the methods concerned have become ever-more sophisticated, while the information provided is increasingly subtle. Such information might be genetic, environmental, technological, temporal, spatial; it might not relate readily to the framework of existing archaeological thought. And the methodology itself is liable to remain a mystery to all but the scientifically initiated.

It is the latter issue, the problem inherent in the widespread use of results of advanced scientific techniques by archaeologists, that this book addresses. The perspective has been narrowed down to consideration of most of the techniques within the physical sciences that are found to be helpful at present. It will therefore be primarily of interest to those archaeologists who want to 'bone up' on

the range of modern methods available. The book is organized by individual techniques — some 30 of them are included — and its strength lies in this and in the generous collection of recent applications which illustrate the various methods.

Although I regret the absence of a global view, the discussion of each method is for the most part accurate and sensible; I found only a few points to quibble at in those fields I know best, and apart from the caveat that much of the recent literature is cited rather too uncritically, I would recommend the book for its main purpose. It also makes more attempt than most to set down simple practical knowledge for the archaeologist, for example in how to provide samples, or in its appreciation of such experimental issues as the statistical presentation of results. The last chapter on computers may help the really frightened not to run away. But although a wide range of topics is considered, the balance seems to have been determined more by the author's research interests than by the relative power of different techniques. Archaeomagnetism is treated in 38 pages (the largest section), while, for example, oxygen isotope stratigraphy receives less than three and the use of stable isotopes in the study of palaeo-diets is covered in under six.

What the book lacks above all, however, is any sense of intellectual excitement. It conveys little of the ingenuity of the scientific thought involved, or of the changing perspective of archaeological scholarship. This lack of sparkle is intensified by the dull and even tone of the writing, which I fear might widen rather than bridge the gap between the two cultures. Finally, readers must surely expect better standards of production for a book of this very considerable price. □

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