Reviews

The neurosciences and behaviour: an introduction (second edition) by D M Atrens, S Curthoys; Academic Press, London, 1982, 214 pages, £5.50 (US: $9.95)

One of the most difficult things a teacher ever has to do is to cope with a sales-resistant audience: for example, one whose members are only attending his classes in order to gain compulsory course credits, full of social psychology students who believe that to analyse behavioural mechanisms in detail will destroy their ability to appreciate the essential human qualities of the whole person. This problem is most acute for the teacher of neuroscience: as a colleague said recently, “The trouble with neuroscience is that you can work at it and work at it and you’ve still only just scratched the surface”. How can we persuade sales-resistant students to work at the massive ground-base of knowledge which they need to acquire before they can appreciate the wonders of brain research? One answer may be that we can recommend Atrens and Curthoys as the set textbook for our courses.

This wholly remarkable book sets out to cover the whole of brain research at an elementary level in only two hundred pages, conveying ideas without bogging the reader down with too many tedious details, and at the same time giving a true impression of some of the main topics of research interest in the field. In this I think the book succeeds. On the one hand there is the clear presentation of information. The layout of each page includes the basic text with many subheadings, full 60 mm wide margins which include brief summaries or paraphrases of the paragraphs alongside, and simple hand-drawn diagrams. The latter are on the whole concise, clear, and accurate, often giving brilliant insight into the basic principles, and with surprisingly rare lapses into misleading oversimplification. I would have liked to see in addition more real photographs and data, for example an electron micrograph of a synapse rather than the several pictures of rats and rat-handling equipment from the authors’ own laboratory. However, such elaborations could be derived from accompanying material given to the student: this book does provide only a skeleton coverage of the basic knowledge needed, and additional fleshing out is necessary. Indeed at the end of each chapter are half-a-dozen references to other textbooks and review articles, and there is also a checklist of questions which provide useful revision exercise. More detailed references for each chapter are given at the end of the book.

On the other hand, the authors have tried to promote an attitude of sceptical enquiry in their readers, an attitude which, although appropriate in advanced students, is rarely attempted in elementary textbooks. All too often university teachers are happy to see their first-year students learning ‘basic facts’ like parroting schoolchildren, and to leave ‘discussion’ of advanced topics to later years in the course [thus course-credit-seeking students who only attend the first-year classes leave with a very dull impression of the subject]. We must applaud Atrens and Curthoys’s attempt to introduce the controversy and debate of active research topics at this level, and to instil an attitude of not-believing-everything-you-read. They convey an accurate and fair picture of the state of research in many fields, and this will provoke interest in committed students. However, I am doubtful about how this approach will be received by others. There is evidence that many students at this level do not yet have the cognitive processes needed to cope with this kind of information (Perry 1970). Some of them seem to believe in the existence of absolute right and wrong, so that when presented with a conflict between two theories, for both of which there is supporting evidence, they approach the teacher at the end of the lecture and say “that was very interesting, but you omitted to tell us which of the two theories is correct”. The honesty of Atrens and Curthoys in admitting our ignorance of even basic facts in some fields and with their emphasis on the methodological inadequacies of many famous studies, may leave a negative impression with the student at a time when we really wish to foster a positive attitude to the subject matter. Their attack on psychosurgery can almost be described as a sweeping dismissal.

The subjects covered in the book are on the whole well balanced. The introductory chapters are on basic physiology, anatomy, and techniques. Readers of Perception will appreciate the fact that the chapter on “Sensory systems” occupies fully one quarter of the book. In this chapter neural coding and a review of all the modalities are included. The visual pathways are described
up to area 17 (but not beyond) and \(W, X, \) and \(Y\) cells and kitten striate development are introduced as well. Some linking hypotheses with perception are presented (Hermann grid, Mach bands, movement aftereffect), and colour vision is especially well described. The auditory system is also covered extensively, with place and periodicity theories and tonotopic cortical structure included, but the localisation of stimuli in space is omitted. The vestibular, somatic, and chemical senses are given two or three pages each, and a final discussion asks whether 'primary' sensations exist. Further chapters cover homeostasis, reward (obviously the authors’ own field), emotion and psychoses. The chapter on sleep I thought too inconclusive, and that on memory much too short.

To summarise, then, Atrens and Curthoys have written a useful little book which fills the gap between the pocket-sized “Notes on …”, the arty book full of pictures of ancient Chinese pottery and woodcuts by Descartes, and the typical seven-hundred-page “Introductory textbook of …”. It successfully walks the tightrope of brevity, clarity, and simplicity with only occasional lapses to either side. Most (but not all) of it is up-to-date, and it is provocative in its open-ended conclusions. Newcomers to brain research who read this book will be given a taste of (and, I hope, for) the field and may even ask for more.

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Reference
Perry W G Jr, 1970 Forms of Intellectual and Ethical Development in the College Years: a Scheme (New York: Holt, Rinehart and Winston)

Mind-storms: children, computers and powerful ideas by S Papert; Harvester Press, Brighton, Sussex, 1980, 230 pages, £4.50 paper (US: $7.95)

Mind-storms is Papert’s credo: it records his vision of an educational Utopia in which child and computer will enter into a symbiotic relationship, as cartographers in the uncharted territory named Knowledge. It is not a book in the didactic sense: rather, it is a collection of essays about children, mathematics, and computers, bound together by powerful ideas drawn in part from the work of Jean Piaget at Geneva, with whom Papert worked for five years in the early 1960s, and in part from the new discipline of artificial intelligence with which he has been so intimately associated at MIT during the last decade.

The reader will quickly discover that Papert’s thesis is that education ought to take advantage of children’s innate capacity to learn, in the significant sense of acquiring and representing knowledge about the world in internal mental structures through their own deliberate endeavours. In plainer language he argues that children learn by doing and thinking about what they do, and he cites learning to talk in an informal cultural environment as a powerful example. He regrets the belief widely held among teachers and educators that children learn through being told. For Papert the classroom is an inefficient, artificial learning environment that society has been forced to invent because its informal environments have failed. He attributes this failure to the fact that much of our knowledge is couched in formal terms and so is not directly accessible to young minds that, as yet, lack the mental apparatus to handle the abstractions of, for example, differential calculus or transformational grammar.

By now, you might have decided that there is little in Mind-storms that differs significantly from the sentiments of earlier pedagogical nonconformists like Dewey and Montessori. From the point of view of a better understanding of the nature of human internal mental representation of knowledge, that might be true. But it is important to realise that his opinions about the nature of children’s learning are but a backcloth to his main concern, namely, the construction of new learning-environments which facilitate learning, because knowledge is represented in ways which directly map to children’s existing representations. While Dewey and Montessori had to settle for paper and pencil as the learner’s tools, Papert is working in an era which offers so much more. While paper and pencil is vastly important since it enables a learner to use symbol systems to externalise his thinking, it is a passive medium. Papert can press the computer into service as a new active medium which enables a learner both to represent his ideas symbolically, and to modify readily the symbolism in the light of the sense he makes of
the actions which result. Clearly, a key issue is the accessibility of the symbolism to children. At this point, Papert turns to artificial intelligence for symbolisms which can shift the boundary of accessibility from the formal to the concrete by offering knowledge in a new form that can be assimilated by youthful mental structures. A powerful example of the mental leverage on concepts afforded by the creative use of technology is turtle geometry. In this system, quantitative mathematical equations describing shapes are replaced by qualitative descriptions for making shapes, written in a modelling language (LOGO) which provides a descriptive terminology for talking about the motion of a pen on a drawing surface. The words in the language, such as FORWARD and turn RIGHT, are meaningful to a child because of her own personal experience of moving around her world, so she herself will have little difficulty learning to use the language to build a procedure which when executed will draw some shape. The procedure externalises her thinking about the problem; her thinking is concretised when the procedure is executed to make a shape, and discrepancies between the intention and the effect actually generated provide useful information for any rethinking of the task.

In practice, the learning environment of turtle geometry has been used quite widely within education. This reviewer has used it successfully to teach mathematical concepts concerned with the geometry of regular plane shapes to primary and middle school children across the ability range. This work has been done in a regular classroom, using structured teaching materials designed to provide a framework for exploration. Although the LOGO language was conceived as a vehicle for exploring mathematical ideas, Papert prefers to view turtle geometry as an environment within which children will learn the heuristic problem-solving strategies proposed by the mathematician George Polya. Papert's argument is that, once learned, children will transfer these domain-independent skills to other problem areas. In this sense, exploring turtle geometry teaches children to think. But there is little evidence in the book, or elsewhere, to support his view. Indeed, the evidence in the literature about contradiction, inconsistency, and incompleteness in mental functioning might suggest that knowledge and knowledge-handling procedures are structurally interdependent. This kind of distributed model of knowledge representation differs from the model that proposes a common knowledge-base accessed by knowledge-free knowledge-handling techniques of various kinds, to which Papert's notion of transfer of heuristic techniques appears to be related.

Finally, Papert looks to the time when computational environments will be capable of sustaining children's learning without significant adult intervention. The implication is that schools as we know them today will have no place. He appears to be pessimistic about the ability of the educational system to respond to innovation, and believes that change will take place via a revolution led from outside the formal education system by informed parents who perceive the gap between what computers can do and what they do do in the classroom. Given that home computers are largely used to run arcade games, one cannot envision parents manning the barricades! But in the long run Papert might be right. However, in the short run, one suspects that the course of education might be better served by espousing reform rather than revolution. Turtle geometry might be an intellectual South Sea Bubble: only time will tell.

Clearly, Mind-storms is a book that raises deep issues. It must be essential reading for anyone who confesses an interest in computer-assisted education. Perhaps most important, it is a unique example of a symbiotic relationship between education and advanced information technology.

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Learning and memory by D A Norman; W H Freeman, Oxford, 1982, 129 pages, £10.95 cloth, £5.25 paper (US: $14.50, $7.50)

In the preface Norman indicates that this short book is intended for the 'noncaptive' reader as well as for undergraduates studying learning and memory. It consists of nineteen chapters with an average length of six pages each. The first twelve chapters cover conventional topics in memory: sensory memory, primary memory, semantic memory, mental imagery, and so on. The last seven chapters are concerned with learning and skilled behaviour. The contrast between these two parts of the book is considerable. In the first part Norman is content to suggest questions: "Does primary memory dissipate with the passage of time?", "Do people really have mental maps?", and
honestly admits that there are, as yet, no answers. As such these chapters represent a statement of
the problems students of memory have concerned themselves with. In the remaining chapters on
learning and skilled behaviour he becomes more prescriptive; we are told how to instruct novice
users of a text editor, for example, though he is still honest enough to admit that the answers he
offers are incomplete. I also found the later chapters much more readable than the earlier ones.
The density and apparent lack of progress conveyed by the earlier chapters may well put off the
noncaptive reader.

The book lacks sufficient ‘meat’ for a conventional undergraduate psychology course. Where it
may be useful is in short courses for undergraduates studying other sciences or engineering.
Cognitive psychology clearly has something to say about the design of the man–machine interface;
indeed, this is the subject of Norman’s last chapter and a major theme in the book as a whole.
For this reason psychologists are teaching short courses to computer scientists and engineers.
These students do not need introducing to the scientific method, which the book rather assumes,
neither is there time to cover much detail. Rather what is needed is to provide an overview of the
approach, something which this book does rather well.

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Beyond the body: an investigation of out-of-the-body experiences by S J Blackmore; Heinemann,
London, 1982, 271 pages, £8.50 (not published in the USA)

During her first term at Oxford Susan Blackmore tried to join the Oxford University Society for
Psychical Research and, discovering the sole surviving member, resuscitated it and ran it for the next
three years. One evening after a ouija board session in her college rooms, drowsy from the tense
atmosphere and a pleasant joint, she suddenly found herself floating down some tree-lined tunnel
and on being asked “where are you?” found herself on the ceiling observing the scene in the room—
and herself—immediately below. The vividness of her experience and its classical completeness
sent her on a quest for explanation that led to her present scholarly contribution to the study of
unusual states of mind.

Out-of-body experiences (OBE) occur to about one in ten people; they may happen during
unusual circumstances, after an accident or shock or when near to death but are also common when
there appears to be no especial reason for their occurrence. Ever since the Society for Psychical
Research was founded in 1882 numbers of eminent scientists and writers have searched for
explanations of these and similar problems: telepathy, hypnotism, ghosts, poltergeists, and other
‘spiritualistic’ phenomena. Many of their studies have been searching enquiries. Sue Blackmore
lives up to this tradition of scholarship in an area which many in the more orthodox sciences still
find decidedly quaint.

Those who are unlucky enough never to have experienced an unusual mental condition probably
do not realise how powerfully real an altered state of consciousness is. Such occurrences require
explanation and appropriate theorising if they are not to remain for ever outside the realm of
reasoned discourse. Sue Blackmore takes us on an extraordinary survey of experiments, descriptive
studies, and theories and her book has the enthralling quality of a detective story.

In the first thirty years of this century, a number of investigators believed in a theory of astral
projection. This widely prevalent theme originated in Madame Blavatsky’s extravagant extrapolations
from existing knowledge of Eastern religious psychology which became more or less codified with
the formation of the Theosophical Society in 1875. In this view, man is not just the product of
his physical body, but a complex creation of many bodies each more subtle than the grosser outer
form. Annie Besant, a prominent theosophist, argued that the ‘self’ must be distinguished from the
bodies which it from time-to-time inhabits. One of these bodies, the etheric, is attached to the
physical, although slightly larger and interpenetrating it. Another finer body, the astral, may
separate from the corporeal form and drift from it, remaining attached by a fine silvery cord which
is clearly ‘seen’ in many of the described experiences. Theosophists have held that the physical
body does no sensing itself. All experiencing is the property of higher-conscious levels such as the
astral. These ideas coincided with the early beginnings of scientific research on the electrical
properties of the nervous system and were formulated at a time when vitalism was for many as
plausible an approach to mental phenomena as interpretations of a physicalist nature, treating all
experience as a material phenomenon in a subjective aspect.

Susan Blackmore gives the astral theory and others like it a very extensive review; so extensive
indeed that she leaves no stone unturned in an endeavour to give such views a maximum possible
say. Her book is published on behalf of the Society for Psychical Research, and the author is
clearly anxious to allow her friends in such circles an adequate representation. Contemporary
psychologists will be more than a little intrigued at this historical account of the interplay of fine
intellects and incomprehensible experiences but may well wonder whether a Trojan horse of straw
has not been erected for conflagration. Some extraordinary stories are presented: the case of Blue
Harary and other subjects who to a degree develop voluntary control of the OBE or other experiences,
the account of major efforts to photograph the astral body in flight, and the weighing of bodies at
death to see if anything has left them. The relativity of early experimental procedures to the
zeitgeist and electrophysical theorising of the early decades of the century make a fascinating study,
for they show with startling clarity how subject the apparent objectivity of experimentation can be
to nonempirical paradigms of thought in which it is historically embedded.

Today we live in an era when physicalist interpretations of the mind are predominant, at least
in Western science. For all her diligence and her apparent desire for it, Blackmore admits there is
no substantial evidence whatsoever for any nonphysicalist or astral-type theory. Yet the 'reality' of
the experiences themselves remains undeniable as she herself knows. What sort of an account is
required of an experience which must essentially comprise a form of illusion?

"Nothing leaves the body in an OBE. The astral body and astral world are products of the
imagination and the OBE itself provides no hope for survival" (page 251). Yet contemporary
psychological thinking to which Blackmore returns does not dismiss the OBE as a mere pathological
oddity. Since I want psychologists to read this important book, I will not disclose her concluding
theory but simply lay a few clues.

It is now possible to define quite precisely the conditions under which an OBE may well occur.
These conditions are defined in psychological terms so that a theory explaining the effects of their
co-occurrence is also a psychological one. The OBE is seen as a relatively stable state of consciousness
which is, however, only maintained within certain psychologically defined boundaries. It comes to an
end when these break down or alter. It is also possible to predict the effect of changes in the
defining conditions and also the course and outcome of the experiential display. This means that
the OBE may become open to experimental manipulation. It may also be possible to map the
experiential space through which an OBEer may travel and the conditions which decide the routes
he or she may take. Skilled OBE travellers may thus come to explore with deliberation the nature of
rare states of consciousness and correlate their findings with coincidental measurements of other
sorts—the physiological, for example.

Although old timers in the Society for Psychical Research may find a purely psychological
theory a disappointment, I agree with the author that such an approach enhances the reputation of
the subject, confirms the interest of the phenomenon, and allows a scientific yet sensitive
exploration of a profoundly complex area of human puzzlement.

Blackmore's book is a substantial achievement and merits wide consideration.

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Books received
Broadbent D E, Weiskrantz L (Eds) The Neuropsychology of Cognitive Function—Proceedings of a
Royal Society Discussion Meeting Royal Society, 6 Carlton House Terrace, London SW1Y 5AG,
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Bryden M P Laterality: Functional Asymmetry in the Intact Brain Academic Press, New York,
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Rayner K (Ed.) *Eye Movements in Reading: Perceptual and Language Processes* Academic Press, New York, 1983, 526 pages, $52.00 (UK: £34.40)

Tuan Y-F *Segmented Worlds and Self: Group Life and Individual Consciousness* University of Minnesota Press, Minneapolis, MN, 1982, 222 pages, $19.50 cloth, $8.95 paper

Uttal W R *Visual Form Detection in 3-Dimensional Space* Lawrence Erlbaum Associates, Hillsdale, NJ, 1983, 163 pages, $27.95 (UK: £14.95)

All books for review should be sent to the publishers marked for the attention of the reviews editor. Inclusion in the list of books received does not preclude a full review.