

Peter Duesberg's claims that HIV is not the cause of AIDS have not been censored but simply rejected.

Martini, or by a less famous artist in 1352. I have no idea of the rights or wrongs in this controversy, but Moran's account of it is so obviously one-sided that I discount it as evidence of a more general phenomenon.

Indeed, his definition of this phenomenon is altogether too general. The case of the scientist prevented by the body that employs him from revealing an embarrassing research result is entirely different from that of the academic scientist whose paradigm-breaking discovery, although widely publicized, is ignored by an intellectually blinkered scientific community. At one end of the scale we may find illicit intimidation to cover up a crime; at the other end, a substantial group of free citizens has a perfect right not to be bounced by a zealous heretic out of what they honestly consider to be the established truth, however wrong-headed this may appear in hindsight.

By fudging the notion of "whistle-blowing" to include cases that are really quite different — for example, Peter Duesberg's well known but thoroughly controverted claims about AIDS — Moran also misses another very important point. On the one hand, it is truly scandalous that scientists employed in confidential research can be muzzled, against the public interest, by quasi-legal corporate coercion. On the other hand, contractual confidentiality is a necessary element of commerce, and prudent silence can sometimes be a civic virtue. For example, an unjustified public accusation of scientific fraud is as reprehensible, and as punishable in law, as any other irresponsible defamatory communication. But this ethical ambivalence is not specific to science, since it clearly afflicts many other trusted professionals such as accountants, engineers, physicians and even security guards.

The heart of the matter, which Moran skirts around but does not tackle directly, is

whether a scientist has an intrinsic right to voice unwelcome scientific opinions in public. The legal situation is quite clear. In a democratic society, scientists have exactly the same rights to free speech as other citizens — no more and no less. They are perfectly at liberty to present their views vocally or in written form. Of course, this might be very costly, but so it is for people or organizations with religious, political or commercial claims that they believe to be just as cogent.

In practice, of course, what these "scientists and scholars in other fields" really want is to be permitted to present their views in reputable journals and books, preferably for free. But here authors have limited legal leverage, except in respect to copyright. The huge social institution called 'the scholarly literature' is largely controlled by unpaid editors and referees and is regulated almost entirely by customary practices and commercial opportunities. It is not answerable to any other authority for its decisions, and cannot easily be brought to book for its occasional follies and injustices.

On the whole, scientific and scholarly editors are extremely conscientious, but so much has to depend on opinion. As Moran admits in relation to the Internet, without critical filtering all serious scientific discourse would be drowned in a flood of wild shouting. But, since editors have no alternative to peer review, how can they ensure that their advisers are not biased? Since expert referees often fail to understand unconventional arguments, who might teach them to be more open-minded? And since the scientific archives are riddled with entrenched errors, how could they ever be intellectually cleansed?

In the end, however, I am not persuaded that the cases Moran cites add up to a systematic pattern of injustice. Let us remember that the scientific community is an agonistic forum. Knowledge is created as much by heated argument as by ice-cold experimentation. The norms and practices of scientific communication pit researchers verbally against one another, but strictly limit their rhetorical weapons. Whatever the hidden passions, superficial impersonality, courtesy and respect for past achievement are as mandatory in the public arena as impeccable logic and empirical fact. It may be deeply hurtful to be defeated in such combats, but it is not necessarily unjust or even shameful. One may yearn to have one's ideas accepted and acclaimed, but one has to accept that the world may decide differently.

But this book is a timely reminder to all of us in the academic community that the practices that are the prime guarantee of the credibility of our enterprise can seem very cruel to those who are crushed by them. □

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How the brain holds our attention

The Attentive Brain

edited by Raja Parasuraman
MIT Press: 1998. 577 pp. \$65, £51.95

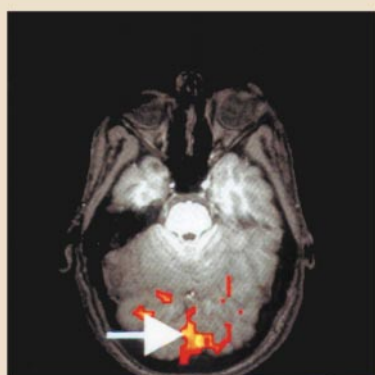
Steven Yantis

In the last decade, explosive growth in the field of cognitive neuroscience has yielded a new scientific society, several new journals and hundreds of articles (many in these pages), all focused on how the brain subserves perception, cognition and behaviour. This convergence of methodologies from psychology, neuroscience, neuroimaging and cognitive neuropsychology has produced dramatic advances in our conception of problems that previously had been addressed separately in each field.

Raja Parasuraman has now compiled an exciting collection of papers aimed at one of the most fruitful subjects cognitive neuroscientists have tackled: attention. The overarching questions are these: given that we can perceive, think about and do only (roughly) one thing at a time — in other words, given that perception, cognition and action are necessarily selective — how is that selection achieved, and how is it coordinated with the behavioural demands faced by the organism? How do behavioural goals, for example, modulate sensory input? How are multiple simultaneous tasks juggled? The consensus that emerges from this book is that there is no single 'centre' for attention in the brain; instead, there are multiple distributed systems of attention that keep things running smoothly and efficiently.

Eight chapters in the first section provide incisive tutorials on the methods of cognitive neuroscience as applied to the study of attention. These methods include invasive neuro-anatomical and neurophysiological techniques, noninvasive neuroimaging approaches (electroencephalography, positron emission tomography and functional magnetic resonance imaging), the analysis of impaired performance in people with brain damage, and computational modelling of attentional control. These chapters alone make the book exceptionally valuable: they offer a comprehensive overview of the key methods of cognitive neuroscience, and their focus on a common topic illustrates how a multifaceted issue like attention can be approached from many different angles, each offering a distinct perspective. This section is aimed at readers who have only a minimal familiarity with basic neuroscience.

Each of the remaining chapters focuses on a substantive question about the workings of attention and then applies one or more of the techniques discussed in the first section to that question. Several of the chap-



Brain waves: "there is no single 'centre' for attention in the brain".

ters in this part of the book employ a method not discussed in the first section, that is, the approach of cognitive psychology. They focus on the analysis of behaviour itself (the speed and accuracy with which perceptual and cognitive tasks are carried out) in populations of normal people, and draw inferences from the behavioural data about how the brain must be organized.

The topics were selected for their value in illustrating cognitive neuroscientific approaches, and the coverage is therefore somewhat idiosyncratic — readers who desire a broader overview of current theoretical issues in attention research may wish to consult offerings in the "Attention and Performance" series (published by Erlbaum and MIT Press), or Harold Pashler's recent tutorial volume, *Attention* (Psychology Press, 1998). However, these chapters provide excellent introductions to more than a dozen fascinating problems concerning how the

brain exerts control over cognition.

One is always tempted to be dazzled by the technological advances that permit increasingly detailed and, in the case of technologies like functional neuroimaging, aesthetically pleasing measurements of brain function. It is these advances, after all, that have made such rapid progress in cognitive neuroscience possible. However, the take-home message of this volume is that satisfactory progress requires careful attention not just to the brain, but to the behaviour that the brain produces. In chapter after chapter, the authors rely on a detailed analysis of the psychological requirements of behavioural tasks to motivate the design and interpretation of their experiments.

Parasuraman's 1984 publication *Varieties of Attention* (with D. R. Davies) was a highly influential collection detailing the problems in attention then faced by cognitive psychologists, and it continues to be widely cited. This new volume promises to be even more useful. □

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Looking after your molecules

The Molecules within Us: Our Body in Health and Disease

by Charles A. Pasternak
Plenum: 1998. 335 pp. £17.55, \$28.95

John Emsley

The traditional groupings in chemistry — organic, inorganic, physical and theoretical — have all but dissolved, due mainly to their interactions with outside disciplines. The demands of those in medicine, biology and pharmacology are changing the foci of chemistry, but this meeting of minds has given rise to the creation and investigation of molecules of fascinating complexity. Their cooperation could also have huge medical benefits.

When science moves quickly and promises to impinge on everyday life, it is important to explain to the public what is going on, before the mischief makers get to work. So far their opposition to the healing sciences has been muted, merely emphasizing the side-effects that new drugs and treatments can have, but of late their voice has become more strident, playing on public ignorance about genetic manipulation and encouraging exaggerated fears about what this might lead to.

For these reasons one welcomes Charles Pasternak's book *The Molecules within Us*, which can be warmly recommended. Pasternak has the expert knowledge and the communicative skills to lead us safely through some of the most complex science that is currently going on. Even though we may soon

forget the detail of what he tells us, we are left with a memorable and upbeat message: that molecules are what we are, and that disease is mainly due to their malfunction.

This is a book of solid science, packed with a mixture of the latest advances in the molecular biology of the human body, and leavened with the author's opinions on the human condition as most of us experience it. It is a mixture of scientific explanation that an educated lay person can grasp, and of common sense that most will agree with.

As its title implies, *The Molecules within Us* is about the basic units that compose the living cell and all the components that go into making us what we are. There are chapters on nutrition and metabolism, genes and the environment, infection and the immune system, stress (an excellent chapter), the workings of the brain (also very good), and ageing and death. Pasternak should now be prevailed on to write a shorter version of his book that can carry its message to an even wider audience.

Pasternak peppers his account with fascinating anecdotes and curious details, such as this: "In Hyderabad, India, asthmatics are lining up to have a small (2 inches long) live fish known as a murrel. . . dropped down their throats. . . one fish per year, for three successive years, is said to provide a lifelong cure."

Before we give a condescending smile at the naivety of the above, we should bear in mind that we in the West are not immune to embracing alternative treatments such as homeopathy, herbal medicine, aromatherapy and reflexology. I was disappointed that Pasternak did not take a harder line on alternative medicine, but perhaps he was advised not to do so, as it might have alienated some of his readers. Nevertheless, his seventh chapter, "Orthodox versus Alternative Medicine", finally comes down against it. Yet even scientific medicine is finding it hard to defeat the devils of cancer. While some death rates from cancer are declining, such as cervical and testicular cancer, others are increasing, such as liver, prostate and lung cancer in women (although this can be attributed to smoking).

I warmed to Pasternak's message in his chapter on the causes of diseases, when he dismisses the prevailing idea that strenuous exercise will prolong our lives. He concludes that, "provided we have no major health problems, we should just continue to sit in our armchairs, read the scientific journals and newspapers about startling new discoveries . . . and go for a walk to buy fresh fruit and vegetables". How comforting it is to find an expert offering such reassuring advice about the lifestyle that many of us have adopted.

This is an excellent book, possibly a little heavy going for the non-scientist, but not for the readers of *Nature*. □

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