

Illusions of pedigree

J.D. Mollon

Seeing: Illusion, Brain and Mind. By J.P. Frisby. Pp.160. (Oxford University Press: Oxford, 1979.) £6.95.

THOSE who teach experimental psychology will instantly recognize the pedigree of this handsome colt: it is sired by Richard Gregory out of Lindsay and Norman. It lacks the turn of speed of its parents but proves an excellent stayer on soft ground, is usually reliable over hurdles and should bring rewards to its backers.

Professor Frisby is to be congratulated on an engaging and remarkably lucid introduction to the problems of visual perception. His declared purpose is to combine the psychological, physiological and computational approaches to perception. He has a good judgement of the important issues. Topics covered in detail include feature detection, figure-ground differentiation, the anatomy and physiology of the visual cortex, object recognition, the computation of lightness, and binocular stereopsis. The concept of spatial frequency and the contrast sensitivity function are deftly introduced for the novice reader. The book is sumptuously and skilfully illustrated and the figures allow readers to experience for themselves many illusions and perceptual after-effects; indeed the author recounts in his preface how he originally set out to produce a collection of illusions for the general reader but, like a novelist taken over by his characters, was soon led to provide the intellectual background. Two-colour anaglyphs, many of them original, demonstrate phenomena of binocular vision. The major omission is a discussion of colour vision; this is odd, even inexcusable, given the lavish facilities available for colour illustration.

The exposition is one of almost unflinching clarity and this is perhaps the most impressive quality of the book. If Frisby has any fault it is that of spelling points out too much — a virtue in a lecturer but a vice in an author; thus he devotes no less than ten, similar, figures to introducing the concept of a corner-detector.

In elaborating the computational approach to visual perception, Frisby acknowledges an explicit debt to D. Marr "whose writings are for me the work of genius". He discusses in detail, for example, Marr's theory of how the retina computes lightness, that is, discovers the reflectances of surfaces that are unevenly illuminated: bipolar cells detect edges by a centre-surround differencing operation; a threshold is applied to the resulting signal; and then (the "deconvolution" stage) lateral facilitation within one class of

ganglion cells causes all cells corresponding to points within a closed boundary to take on the lightness-signal indicated by the signal at the edge. Now, Marr's histological reification of this algorithm is, as Frisby says, "controversial" (to say the least), but there is a more general difficulty. The whole of Chapter 1 was devoted to disabusing the novice reader of a belief in the 'inner screen' theory of perception (the view sometimes called the Gestaltist fallacy); if our novice reader has taken that chapter to heart, then, when he reads Frisby's account of the computation of lightness, he will want to know why the visual system goes to such trouble to produce a picture of the scene in which lightnesses are redundantly represented in the interiors of homogeneous areas, why, that is, the deconvolution is necessary. And he won't be told.

Frisby leaves to a late stage in the book the details of retinal anatomy and physiology. Perhaps it is in this area that he is least sure of himself, for it is here alone

that errors occur in any density: in the course of two pages, the inner and outer synaptic layers are confounded, the pigment epithelium and choroid are labelled "sclera", rods are said to be 500 times more sensitive than cones because they contain rhodopsin, the fovea is said to contain only cones, an error of 10^3 is made in equating retinal extent to visual angle, and the amphibian mudpuppy (in a remark apparently lifted almost verbatim from Blakemore) is described as a fish. Undergraduates should be directed elsewhere for their retinal physiology.

The contributions of the editor, Henry Hardy, and the art director, David Warner, are so manifest in this book that their work deserves explicit congratulation. *Seeing* will be equally in place on the coffee table and on the first-year reading list. I strongly recommend it. □

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Flawed search

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In Search of Ancient Astronomies. Edited by E.C. Krupp. Pp.277. (Chatto & Windus: London, 1980.) £8.95.

THIS book arose from a series of lectures given by the contributors in California in 1975, and is, according to its editor, "the first attempt to present systematically to the general reader the main results of archaeo-astronomy to date". It consists of seven chapters, four by the editor and one each by Professor Thom and his son, Dr John Eddy and Dr Anthony Aveni. It is clearly stated in Krupp's introduction that the "pseudoscientific misconceptions" of Erich von Daniken, Velikovsky and the like are to be "dispelled by the reliable, scientific findings of archaeo-astronomy"; it is unfortunate, therefore, that the majority of the chapters show some misuse or misunderstanding of archaeological data and imprecision in the demonstration of astronomical alignments.

The first chapter by Krupp himself is presented as a non-mathematical introduction to practical astronomy. This is necessary for the understanding of subsequent chapters, and is in general comprehensible, though some of the information could have been transmitted with fewer words and greater clarity.

For many readers the work of the Thoms will be the most familiar, and their chapter on stone circles and menhirs follows. Thom's eminence in the field is largely based on the accuracy of his measurements and the precision of his analysis. Recent papers and reviews have, however, cast doubt on some of his figures, with serious

results for his megalithic yard and megalithic calendar (Moir *et al.* *Antiquity* LIV, 37-43, 1980). Misidentification of archaeological monuments has resulted in Thom's describing hut circles and enclosures as stone circles of megalithic type, and some of the lines of foresight suggested for certain sites are shown in the field to be below horizon level, difficult to see without binoculars or blocked by natural features not obvious from maps. Some controversial sites appear in this chapter: the Crucuno Rectangle, for example, described by Thom as "lunar standstill alignments", is claimed by Daniel in *Antiquity* XLIX, 81, 1975, to be an AD eighteenth century folly. For the archaeologist prepared to be convinced, some of Thom's claims appear thin and several statements contentious. To be told that, at Rough Tor in Cornwall, many of the upright stones have fallen and the remaining ones do not adhere closely to the flattened circle design, perhaps because of solifluxion, begs the question — what flattened circle design is there left to be measured. Rules about the use of megalithic yards are stated, only for exceptions to be made immediately: "the sides of these triangles all had to be integers in megalithic yards", followed by "the builders discarded the rule that all radii must be integers".

The third chapter, by Krupp, deals with the work by archaeo-astronomers and others on the site of Stonehenge, several of whose papers have appeared in *Nature*. In general the treatment is descriptive rather than critical, which may be misleading for the general reader. Analysis of Hoyle's claim that Stonehenge was an eclipse predictor has been published by Moir (*Antiquity* LIII, 124-128, 1979); he points