## Visual Systems Analysis

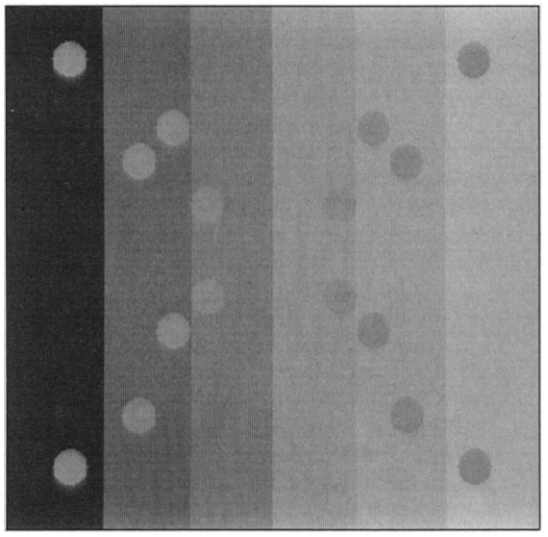
**Contrast Sensitivity.** ROBERT SHAPLEY and DOMINIC MAN-KIT LAM, Eds. MIT Press, Cambridge, MA, 1993. xx, 342 pp., illus. $85 or £76.50. Proceedings of the Retinal Research Foundation Symposia, vol. 5. From a symposium, The Woodlands, TX, March 1992.

At the beginning of the 17th century René Descartes proposed the first plausible neural theory of vision and visual perception and thus began a scientific enterprise that has continued unabated to the present day. The characteristics of this endeavor were already firmly established by the end of the 19th century: the study of perception, especially visual and auditory perception, was a mixture of the study of philosophy, physics, physiology, and psychology. This blend is reflected, for example, in Fechner's coining of the term "psychophysics" in 1860, in Bain's establishment of the journal *Mind* in 1876, and in the founding of the German-language journal *Zeitschrift für Psychologie und Physiologie der Sinnesorgane* by Ebbinghaus and König in 1890.

Scholars working to understand vision and visual perception have kept close to the Cartesian goal of figuring out "how it works" by investigating both the psychology and the physiology of perception. Most successful psychological theories of vision are formulated to be physiologically plausible. There are numerous instances in the past 100 years in which psychological theories preceded the discovery of the physiological substrate. The existence, for example, of three types of cone receptors in human vision was established from psychophysical experiments well before their anatomical reality was revealed. The history of vision research has been a process of continual improvement of our understanding of how the physical world comes to be represented in our mind by our brain.

*Contrast Sensitivity* would have astonished and delighted Descartes, Fechner, and Ebbinghaus, for it reveals the tremendous progress we have made in understanding the psychophysical and physiological processes that contribute to visual perception. The book concentrates on one of the most important of visual functions: the extraction of contrast information from the environment. The editors, who provide introductory commentaries on the individual contributions, have done a masterly job of organizing the material into a logical framework. The book is divided into four parts: Retinal Processing of Visual Signals, Retinal Ganglion Cells, Central Visual Pathways, and Human Contrast Sensitivity and Its Clinical Applications.

The individual chapters themselves are uneven in quality. One or two of them are poorly organized and written in such a manner that only an expert in the topic under discussion would understand them. These are counterbalanced by many others that are brilliant examples of clear expository writing, providing historical background material, a general rationale for the methods employed, and a succinct summary of the findings as well as insights into how these findings fit into a larger picture. Shapley's excellent introduction gives a comprehensive summary of the book. The contribution by Rodieck, Brening, and Watanabe on the origin of parallel visual pathways will delight the reader with its detailed comparison of the cat and monkey visual systems.



"Sixteen equiluminant circles on a luminance staircase. This pattern was created on a CRT display with a computer-controlled instrument. Each rectangular area in the staircase is of a fixed uniform luminance. The luminance of the circles—all of which have the same luminance—is the same as the mean luminance of the staircase." [From *Contrast Sensitivity*]

In a marvelous paper on retinal ganglion cells Enroth-Cugell traces in fascinating detail the historical development of sensory neurophysiology, putting the work of many researchers, including her own, in proper historical perspective. The chapter makes it clear why Enroth-Cugell deserved her 1992 Helmerich Award for outstanding contributions to visual science.

The book is not entirely successful in developing a picture of the precise relationship between physiological activity and perceptual experience—which is not surprising, given the difficulty of the enterprise. Nonetheless, I strongly recommend it to all scientists who want to deepen their understanding of the functioning of the visual system. The vision specialist, regardless of background, will learn much from it.

*Lewis O. Harvey Jr.*
*Department of Psychology*
*University of Colorado*
*Boulder, Colorado 80309–0345, USA*

■

## A Trans-Specific Agenda

**The Great Ape Project.** Equality Beyond Humanity. PAOLA CAVALIERI and PETER SINGER, Eds. Fourth Estate, London, 1993, and St. Martin's, New York, 1994. viii, 312 pp., illus. £9.99 or $21.95.

Should we conserve the great apes and their remnant habitats? Of course!

Should we eschew extreme notions of human transcendence over biology and try to learn as much as we can about the human career and condition by observing the behavior of captives and natural populations of apes? Most certainly!

Should we stop the dyseducational use of apes as Calibans in drag by entertainers and advertisers? Absolutely!

Should we eliminate their employment as subjects in medical and basic biological research involving painful invasive and highly restrictive procedures? Probably in most, perhaps all, cases.

Must we view ourselves as great apes or accept them as humans in order to accomplish these goals? Probably not.

I had reached these conclusions over the past decade before encountering *The Great Ape Project*, a collection of short essays that severally address these issues.

The volume opens with a "Declaration on Great Apes," which demands expansion of the community of equals to include not only all people—as great apes—but also chimpanzees, bonobos, gorillas, and orangutans. Accordingly, (i) no member of the community may kill another, except in self-defense or similar extremity; (ii) no member should be imprisoned without due legal process, and current captives should be released; and (iii) no great ape should be subjected to severe pain, either wantonly or for an alleged benefit to others.

This declaration is supported by 36 authors in 30 chapters and an editorial epilogue. The authors are almost evenly divid-