

experiments intriguing, partly because the results are at times counterintuitive. As a result, I expect his presentation to be compelling to individuals interested in social-psychological phenomena.

In the remaining seven chapters, Lerner demonstrates how research and theory in various areas of social and developmental psychology help provide a more complete understanding of the belief in a just world. For example, the research on (a) the condemning and devaluing of victims, (b) reactions to being personally victimized, and (c) the assigning of blame, as well as that concerned with the Just World Scale, is first summarized in detail and then integrated into the framework of the belief in a just world. In these chapters Lerner carefully, slowly, and quite effectively builds a case to help support his initial contention

that the belief in a just world is a *central* principle that people employ to organize their life experiences.

Overall, the book's numerous strengths include a lucid presentation of just world theory, a comprehensive integration of research findings, and certainly, an extremely engaging style. The only consistent weakness I found is a tendency to overinterpret the research findings. The book is replete with implications for future research studies. This alone makes it worthwhile reading for graduate students in the field. I expect *The Belief in a Just World* to make a substantial contribution to its readers, even those who are already familiar with the studies contained in it. Lerner's enthusiasm for his research and the years he spent refining his theoretical framework are both clearly evident. ■

the listing of certain undergraduate courses suggests this be so—members of each group should inform themselves of developments in the other. Unfortunately, when peering over this epistemological fence, members of both groups, as often as not, are dissatisfied with what they see. I suspect, however, that this dissatisfaction reflects more on presentational form than on content. Too often, we are not good communicators to our fellow scientists and their students.

Visual Coding and Adaptability, edited by Harris, contains 10 chapters written by researchers unabashedly of the former group, the neurophysiologically styled perceptionists; I, on the other hand, am just as unabashedly a member of the latter group, the psychologically styled perceptionists. It is a pleasure, then that, as I peer over this collection of essays on neural images and modulation transfer functions, I can say that I like what I see. The book is a good one; it is generally well written, and it is directed at psychologists not well versed in the hard core of *Vision Research*. Selected chapters would be excellent for upper- (and even mid-) level undergraduate courses, the rest handsomely suitable for graduate-level courses, and nearly all of them *almost* fun to read. This latter fact may seem particularly odd since the most salient unifying theme across the collection is, as suggested by my title, the discussion of one-dimensional square-wave and sine-wave gratings.

Singly the most useful chapter, in a pedagogical sense, is Weisstein's "Tutorial: The Joy of Fourier Analysis." Though the last chapter in the book, it is, logically speaking, the entrée. Anyone who has ever taught a course in perception becomes chary at the prospect of teaching Kuffler cells and spatial-frequency analysis—one can just see the eyes of the smarter students roll and those of the duller students glaze over. There are simply few good sources outside of lecture to help the students along. Here's one. Weisstein disarms the reader with her introductory prose and in 15 pages puts together the rudiments of one- and even two-dimensional Fourier analysis. Particularly useful are her discussions of the relation between a series of bars (a periodic stimulus) and a single bar (an aperiodic stimulus), between Fourier analysis and Fourier synthesis, and between Fourier analysis as an abstract mathematical method and as a model for what the visual system might be doing.

Related, but going steps beyond Weisstein's tutorial, is a chapter by Weisstein

Bars and Stripes Forever: Fourier Analysis and Vision

Charles S. Harris (Ed.)
Visual Coding and Adaptability
Hillsdale, N.J.: Erlbaum, 1980. 399 pp.
\$24.95

Review by
James E. Cutting

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Anyone with an interest in perception has surely noticed a split. It has perhaps less to do with style of research than with style of explanation. On the one hand, there is a group of researchers that investigates perceptual phenomena and tries to explain them in terms of receptors, neurons, cell assemblies, and other members of the molecular menagerie of neurophysiology. On the other, there are those who ply the same phenomena and try to explain them in terms of context, configuration, and other molar constructs of psychology. The former researchers ally themselves with, and are usually funded as, biological scientists; the latter typically consider themselves, and

are funded as, social scientists. Conceptually, the two styles need not be mutually exclusive—and they should not be insofar as the brain and mind are both biological entities—but methodologically they are opposed, and have been at least since the time of Helmholtz and Hering. Charles S. Harris alludes to this split in a charming way: "It's been said that psychologists often struggle to find behavioral correlates for neurophysiology that's ten years out of date (whereas neurophysiologists, a more cautious breed, ignore behavioral data until it's at least 40 years out of date)" (p. 134).

If perception is to have the semblance of a coherent discipline—and more than

and Harris on "Masking and the Unmasking of Distributed Representations in the Visual System." The first part of this chapter reviews the evidence and the aesthetic appeal of Fourier analysis as a way to represent visual information in a distributed manner, rather than relying on punctate critical features. I fault them only on delving, I think too far, into other types of distributed representational systems—holograms and holographic models of memory. But the point of distributed systems is well made, and a good one for both undergraduates and graduates to think about: Distributed representation preserves the integrity of a stimulus better than a focally organized one does. This chapter goes on to review the evidence in support of such representation—the work of Weisstein and colleagues—in which effects of a masking stimulus are demonstrable even when the mask does not spatially overlap the target. In this manner, a bar can mask a grating, not just over the region covered by the bar, but over its entire extent. One must remember that these effects though robust are small, but such evidence is strong support for distributed representation because, in Fourier analysis, the bar and grating look more alike than they do as visual stimuli. In the latter half of the chapter the authors take a different tack, one they admit is only partly related to what went before. Here their discussion is more in line with the position of perceptionist as social scientist. In particular, they review their work on the object-superiority effect, in a series of studies that began with their *Science* paper and which Weisstein and colleagues have pursued. This effect, analog to the word-superiority effect of Reicher and of Wheeler, is a tantalizing one in which the visual system seems to demonstrate its preference for two-dimensional line configurations that resemble objects in the real world over ones that do not. It is one of the best worked-through examples of the perceptual superiority of wholes over parts. So far as I know, this is the first place that this work is discussed in the detail that it deserves.

Spatial-frequency channels

Graham, in her chapter "Spatial-Frequency Channels in Human Vision: Detecting Edges Without Edge Detectors," reviews with exquisite care the dispute over primitives in the visual system: edge detectors versus spatial-frequency channels. Of course, she sides with the latter view, as do apparently all of the contributors to this volume, but she realizes that

most of us were weaned on the bars and edges of Hubel and Wiesel. Moreover she presents the more recent work of Shapley and Tolhurst and of Kulikowski and King-Smith, which suggests the necessity for feature detectors beyond simple spatial-frequency analyzers. She systematically reviews their evidence, points out the attractiveness of their proposal, then entertains a counter-proposal that considers assumptions of a Fourier-analytic probability-summation model. To my eye, she accounts for the data just as well, and negates the need of these detectors. In a related chapter, "Neural Images: The Physiological Basis of Spatial Vision," Robson takes us through the visual system in the accustomed retina-to-cortex manner. What is new to Robson's approach is that the *entire* pathway is discussed in terms of spatial-frequency analysis. Most textbooks that I have seen, if they discuss spatial-frequency analysis at all, often stop before or at the lateral geniculate. Moreover, by the time we reach the cortex, we are back to bars and edges and Hubel and Wiesel. The systemic approach of Robson is heartening and informative. It ends with some interesting speculations and several pictures. One, appropriately enough, is of Fergus Campbell's window at St. John's College, Cambridge, and another is of a subset of possible responses of cortical cells of that window after spatial-frequency filtering. In a usefully homuncular way, it is interesting to see what your cortex might see. More on this later. The only fault I can find with both Graham's and Robson's approaches is the relatively little discussion of the work by De Valois and his associates, Albrecht and Thorell. This probably reflects only the long time it has taken for the book to appear.

The fifth in this aggregate of papers on Fourier vision is that of Julesz, "Spatial-Frequency Channels in One-, Two-, and Three-Dimensional Vision: Variations on an Auditory Theme by Békésy." The theme is, in essence, critical-band masking. This delightful chapter is a sequel, and much superior, to a previous work. A decade before, Julesz wrote a chapter with Hirsh comparing vision to audition. Annoyingly, it took them 57 pages to decide that there really were not any "deep" comparisons worth making. Here Julesz recants. He first discusses frequency channels in audition, reviewing the work of Békésy (who spent 22 years at the same institute in Hungary from which Julesz received his degree). Next he reviews his own work with Stromeyer on visual masking by high-

and low-filtered one-dimensional noise, finding an elegant parallel to the auditory work of Fletcher and Munson 35 years before. Julesz then turns to his inherently more interesting two-dimensional work with Harmon in which they demonstrate critical-band masking of familiar faces, like those of Lincoln and the Mona Lisa. He follows this with a useful discussion of the two-dimensional modulation transfer function. Most readers will have needed to read Weisstein's and Robson's chapters in order to understand this section. Its accessibility, however, is amply enhanced by many figures of the kind that Julesz has accustomed us to—fuzzy blotches that resemble what might accrue in the building of honeycombs by drunken bees. He ends his presentation in three dimensions, building on chapters 3, 4, and 5 of his book *Foundations of Cyclopean Perception* using paired random-dot stereograms. The general discussion makes some curious and provocative claims. The first of these is seen in the following quotation:

Now that we know that the visual channels have bandwidths of 1 or 2 octaves, it is obvious that the visual system cannot be thought of as performing Fourier analysis. Even the much more narrowly tuned frequency channels in audition are too broadly tuned for that. In order to perform a Fourier transform that preserves the information in the incoming stimulus, thereby allowing for an inverse Fourier transform that reconstructs the stimulus from its frequency components, the channels would have to have exceedingly narrow bandwidths (strictly speaking, infinitesimal). If each channel responds to frequencies over a range of an octave or two, then obviously it is providing an equivocal and unreliable report about the presence of any particular frequency. (p. 308)

Julesz claims that the visual system cannot be performing a Fourier transform on the stimulus because it is too broadly tuned to allow *inverse* transform and *recovery* of the stimulus. Such a claim may be correct, but the rationale surprises me. Why would the visual system need an inverse transform to recover the original stimulus? This seems to smack of a homunculus-in-the-sensorium infinite-regress view of perception. Why should not the stimulus simply lose its familiar form as soon as it enters the perceptual system? In most natural situations it remains there to be looked at if the perceiver wishes another glance to obtain more information from it. Regardless of his rationale, Julesz presents a view seemingly at odds with the brunt of the volume: He suggests that spatial-frequency analysis is perhaps not the way to

understand vision. Closer scrutiny, however, reveals that others, particularly Graham, also talk about the problem of relatively broadly tuned analyzers and all are, on factual grounds, not in disagreement. His second interesting claim is that spatial-frequency channels serve pattern recognition less than they serve attention: To attend to high-frequency information is to attend to details, to attend to low-frequency information is to attend to global features. Such a view is consonant with the more psychologically oriented work of Navon and of Kinchla on the perception of local and global features of the same array.

Beginning: Interesting, less coherent

These five chapters close the book. The five chapters at the beginning are no less interesting, but form a less coherent package. Mitchell, in his "The Influence of Early Visual Experience on Visual Perception," discusses the controversial literature on the experiential influence of uni-directional stripes on the response characteristics of cortical cells in kittens. He pairs this information, in a fascinating manner, with that on acuity in humans who have various forms of astigmatism. It appears that early and long-term astigmatism decreases the population of cortical cells responsive to orientations most affected by astigmatic diffusion of information on the retina. He demonstrates that such experiential effects are not correctable by glasses. Thus provoked, we are left with the idea that astigmatics are experiments-in-nature of a kind not radically different from kittens in the striped-column cages of many laboratories throughout the world. Hein follows with his "The Development of Visually Guided Behavior" in which he reviews his important work with Held and colleagues on the interrelation between visual experience and the ability to locomote. This work, the rudiments of which even introductory psychology students are familiar with, is made fully coherent here for the first time. It is helpful to have such a resource readily available. Held himself, in "The Rediscovery of Adaptability in the Visual System: Effects of Extrinsic and Intrinsic Chromatic Dispersion," discusses some fundamental optics, demonstrating the differential bending of lights of different wavelengths, and speculating on what the nervous system does to (over-)compensate for it. Harris, in his "Insight or Out of Sight?: Two Examples of Perceptual Plasticity in the Human Adult," discusses first his earlier work on percep-

tual adaptation to prisms and mirrors, and then the whole realm of findings associated with the McCollough effect. Although analysis of the color adaptation of *edges* is anomalous in this book on spatial frequency, Harris gives the most complete treatment of this intriguing finding that I have seen. Like many of the other chapters on other topics in this volume, it serves as an excellent source. Particularly interesting is his reconsideration of learning by association as an alternative explanation to feature detection. In this manner Harris reveals his sympathy for nonfeature-detection approaches to pattern recognition found in the other chapters. Harris has long been wary of overpopulation of the cortex with logical extensions of meta-hypercomplex cells. It was he who coined the phrase "yellow Volkswagen detector" to belie the efficacy of such approaches.

Finally, packed in the middle of the volume, is an important but difficult chapter by Teller, "Locus Questions in Visual Science." She presents an autobiographical study of the Westheimer effect, a scoptic spatial sensitization of the detection of a small test flash by a surrounding back-

ground disc. She has used this phenomenon to ply the visual system in answer to the question, "Is it peripheral, or is it central?" The problem, she recounts, is that the answer to this deceptively simple question is extremely difficult because this question, and many others like it, is ill posed. The only peripheral/central criterion is to work one's way through the system, retina to cortex, and to decide somewhat arbitrarily when the signal has begun "looking more like the response." For this criterion to work, one must start with a stimulus that is neither too similar to nor too dissimilar from the response. One is left with the idea that the answer to this question in many regards is indeterminate and, more seriously, uninformative.

In summary, *Visual Coding and Adaptability* is a good book. Many of us have grown tired of Erlbaum collections. We remember that we have read little in many previous ones. My advice is: Reconsider. This one is much better than most. If you do not subscribe to, and read, *Vision Research*, you will learn a lot. Moreover, the material is in an accessible, well-written form. ■

Who Controls Parent-Child Interaction?

Hugh Lytton
Parent-Child Interaction: The Socialization Process Observed in Twin and Singleton Families
New York: Plenum Press, 1980. 384 pp.
\$35.00

Review by
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Since Bell's (1968) seminal paper, the bidirectionality of parent-child influence has been widely accepted, along with recognition of a need for analytic methods that can be used to tease directionality apart. Global ratings and parent/child correlations, the staple of 1950s socialization work, have yielded to

molecular descriptions of toddlers' and infants' behaviors, to sequence analysis, and to decomposition of causality using cross-lagged correlations. Lytton's book is right at the center of these new developments in socialization research and makes use of both sequence analysis and cross-lagged correlational methods. What we most ad-