

Cumerford suggest that the projection field of traditional fusion theories can be restructured to account for this powerful effect.

The one flaw in Ono and Cumerford's valuable chapter is that if "hard wiring" underlies the depth constancy phenomena, then it still cannot explain the rescaling of depth resulting from cue-conflict.

The problem confronted by Ono and Cumerford is but one example of the general problem of all the spatial constancies. As Rock has argued so forcefully in his chapter in this book, the organism behaves as though it is making inferences about size, shape, or lightness based upon the analysis of available information. These unconscious inferences, first employed as explanatory devices by Helmholtz, are still the bases of the major theories of the constancies (always excepting Gibson). The general approach dictated by the concept of unconscious inference often leads to theories in which the inferential steps are given mathematical form. An example is that provided by Oyama. Gogel departs from this general approach by assuming a set of postulates embodied in his equidistance tendency, adjacency principle and, most recently, his notion of a specific distance tendency. But given these postulates he then goes on to show how size and distance to objects may be computed.

Rock does not want the hypothetical internal computer to come to only one solution to the problem of determining the size of an object (or its lightness too, for that matter). This follows from the obvious fact that often judgments are more in conformity with the proximal stimulus than the distal. Consequently, he proposes that multiple solutions to the perceptual problem are possible. He is clearly accepting more than unconscious inference from Helmholtz. The accessibility of the proximal stimulus to the observer is not very far away from Helmholtz's notion that under certain conditions one may also attend to basic sensations by teasing them out from the often more compelling perceptions to which they give rise.

ALTHOUGH the chapters in this book

are interesting and mostly of high quality, in this reviewer's opinion they demonstrate several basic flaws in the field itself. The chapter by Day and McKenzie, for example, teaches us that the habituation method often leads to results that differ from those obtained by operant methods in the study of constancies in infants. These authors do not speculate on why such differences should occur nor on their implications for the development of perception. Also, not enough justice is done to the relatively good progress made in the study of lightness constancy. Emphasis is given instead to Gilchrist's demonstration that perceived spatial arrangements have a stronger effect on perceived lightness than was found by Hering and by Beck

and Hochberg. However, good theories are not destroyed by facts they do not cover. Theories employing concepts such as lateral inhibition and concentric receptive fields are still viable and should not be dismissed. The effects found by Gilchrist require that some means be discovered for handling interactions that the earlier theories do not cover but the theories themselves are intact. It should be noted that criterion problems may be of great importance in this context. Finally, major emphasis is given here to phenomena and to descriptions of stimulus relations associated with them. There is little in this book to show that we have made many important advances in understanding the mechanisms underlying the constancies since 1935.

The Skills of the Plodder

Arthur S. Reber and Don L. Scarborough (Eds.)

Toward a Psychology of Reading: The Proceedings of the CUNY Conferences. Hillsdale, N.J.: Erlbaum, 1977. Pp. xii + 337. \$18.00.

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Both editors are Associate Professors of Psychology at the Brooklyn College of the City University of New York. Arthur S. Reber, a Brown University PhD, was previously a faculty member at the University of British Columbia, and has been a Fulbright Visiting Professor at the University of Innsbruck (Austria). Reber's primary research interests are unconscious cognitive processes, studied primarily through the learning of complex, artificial languages. Don L. Scarborough earned his PhD from the University of Pennsylvania. His primary research interests are reading, human information processing, perception, and memory.

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A philosopher of science might complain that there cannot be a psychology of reading, any more than there can be a psychology of dishwashing or of billpaying, but only intrinsically unrelated psychologies of eye movement, of character recognition, of language, and so on, underlying the activity of reading. His argument could be corroborated by the diversity of subject matter in the eight papers collected here. Yet, as R. C. Calfee insists in his contribution, a shrewd analysis of the pitfalls of testing, it is no simple matter to study reading skills in isolation. Moreover, certain common themes recur often enough in this book to justify its title. Many of them are introduced in two long papers (L. R. Gleitman & P. Rozin; Rozin & Gleitman) really forming a comprehensive and insightful psycholinguistic treatise on "the structure and acquisition of reading" that could well have been published separately.

One such theme is the effect of orthographic structure on reading. Rozin and Gleitman make the usual point that while the principle of a logographic system is easier to grasp, a phonographic (syllabary or alphabetic) system, once understood, facilitates analysis of unfamiliar words. But a logographic system and a phonographic system each have a further distinct advantage lacking in the other, as L. Brooks shows, in what is certainly the most original paper in the book. In experiments with artificial character sets, he finds that, even if only six different words are to be remembered, an alphabetic four-character representation of a word, once learned, is read faster than an arbitrary four-character representation; and that, even if as many as 120 different words are to be remembered, a "glyphic" representation, in which the four characters are stacked and superimposed to form a complex, visually distinct symbol, whether alphabetic or arbitrary, is read faster than a representation in which the four characters appear in horizontal sequence. Brooks's results support J. Williams's observation, in her perceptive account of her work with the learning disabled, that the "whole word" method is not a desirable strategy for teaching children to read an alphabetic orthography. They also imply that, in principle, the advantages of phonological correspondence and visual distinctiveness could be combined in an orthography that was both phonographic and glyphic. It is interesting that before the advent of printing, alphabetic scripts made more common use of devices that are moves in the glyphic direction (e.g., the tilde over a letter to represent following *n*), and that there are no actual writing systems that are neither phonographic nor glyphic.

A familiar controversy provides another theme: Is the reader a "plodder" (to borrow Rozin and Gleitman's terms, p. 59) who proceeds letter by letter, or an "explorer," who samples the printed page selectively to confirm educated guesses? Rozin and Gleitman themselves believe that the truth lies somewhere in between. These two hypotheses, however, are usually formulated by their proponents so vaguely as to raise a doubt whether they can serve

as endpoints of a meaningful continuum. But for what it is worth, the evidence in other studies reported here is all on the side of the plodder. K. Rayner and G. W. McConkie have ingeniously experimented with a computer-controlled system that can track a reader's eye movements and modify the text on a CRT display as it is read. Their subjects (reading textbook material, to be sure, and anticipating a comprehension test) progress quite methodically from left to right, have a surprisingly narrow "perceptual span" within which they can identify words during a fixation, and tend to fixate longer on more difficult words. And W. Kintsch, studying the semantic structure of texts, finds that reading time for a text is quite sensitive to the number of elementary propositions and the number of distinct propositional arguments in the text base. Neither of these findings offers much encouragement for the "explorer" hypothesis.

THE special kind of awareness that a child must develop in order to read an alphabetic orthography is stressed by several contributors. But there seem to be various misunderstandings about what the child can be and must become aware of. Exercises in blending and segmentation serve to awaken the child's linguistic intuitions, but Williams (along with many other students of reading) calls these skills "auditory" (pp. 283-285). I. Y. Liberman, D. Shankweiler, A. M. Liberman, C. Fowler, and F. W. Fischer, who give an illuminating account of the performance on certain linguistic tasks of good and poor readers, understand about linguistic awareness very well, yet they suggest that the relative inaccessibility of linguistic units depends on the degree to which they are encoded in the speech signal. Their subjects are said to count syllables more accurately than phonemes because the former are less encoded than the latter (p. 210). But if a child counts syllables accurately, it is because he or she has access, not to unencoded acoustic information, but to representations of phonological syllables in a mental lexicon. (For an utterance such as [sku], speakers of English and of Japanese

would give different, but equally correct responses.) Such access is probably facilitated by the phonological (not phonetic or acoustic) identity between one-syllable words and the component syllables of longer words. Rozin and Gleitman, going a bit further, argue that learning to read "requires . . . gaining access to the machinery in the head which analyzes and produces sound segments" (p. 56). But gaining access to highly encoded segments through the machinery of speech perception is probably impossible and surely unnecessary. The child's task is rather to relate orthographic representations just to the output of the perceptual and linguistic machinery, phonological representations. Access to phonological segments has to be achieved by analysis of the larger phonological units of which the child is already aware: syllables and words. The encodedness of speech is relevant to linguistic awareness only in that it underlies a pedagogical difficulty: Since encoded sounds cannot readily be uttered in isolation, the teacher cannot refer to the phoneme /b/ by saying "[b]," but if "[bə]" is said, the student may be misled.

MUCH more might be said about these papers, every one of which is lucid, thoughtful, and in one way or another provocative. The editors have done a service in making them available.

The aspiring man needs to recognize the merits of his older contemporaries without letting himself be hindered by their shortcomings.

—GOETHE

When we do not crave to seem important we are not awed by the importance of others.

—ERIC HOFFER
Passionate State of Mind

Sloth, like rust, consumes faster than labor wears. The used key is always bright.

—BENJAMIN FRANKLIN

The superior man understands what is right; the inferior man understands what will sell.

—CONFUCIUS