BOOK REVIEWS

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Perceptual Organization

M. Kubovy and J. R. Pomerantz, Eds.

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Almost a century has elapsed since the Gestalt psychologists first emphasized the importance of internal organization processes to perception. The work of Gestaltists has had an enormous influence on perceptual psychology; largely through their compelling visual demonstrations which can be found in most textbooks on perception. However, Gestalt concepts such as Pragnanz, isomorphism, wholism, and so on; though commonly invoked, are shrouded in ambiguity and often fraught with difficulties. The present volume was undertaken to evaluate the current status of the Gestalt approach to perception, and to compare it with other approaches currently in vogue, such as those arising from the work of Helmholtz and of Gibson.

The contributors to the volume are all distinguished workers in their fields of specialization. The first chapter, written by Norma Graham, presents a very readable survey of psychophysical work on spatial-frequency channels. In Chap. 2, Bela Julesz reviews his studies of texture discrimination and figure-ground perception. There follow two excellent chapters on auditory processing, by Michael Kubovy and Albert Bregman, which are described below. Next, Wendell Garner critically explores work on wholistic perception. As he points out, there has been a lack of clear definition as to what constitutes analyzed or unanalyzed perception, and much of his chapter is devoted to clarifying this issue.

Chapter 6 by Pomerantz constitutes a thorough survey of organizational effects in vision. The chapter focuses on grouping phenomena; how grouping may be measured, what causes it, and what its consequences may be. Next, Kahneman and Henik argue that considerations of perceptual organization are indispensable for a theory of attention, and that the concept of perceptual object and rules of grouping are essential to understanding the phenomena of selective attention. Chapter 8, by Irving Biedermann is concerned with the perception and comprehension of real-world scenes, especially the classes of relations between objects that are needed to characterize the difference in organization between a well-formed scene and an array of unrelated objects.

Julian Hochberg (Chap. 9) presents a thoughtful appraisal of the major theoretical approaches to perception. He points out that theories of organization differ in the roles assigned to stimulus structure, mental structure, and degree of wholism assumed; and he analyzes the major perceptual theories from this standpoint. Next, Roger Shepard speculates from an evolutionary perspective on the internal processes by which external objects and events are represented. Following this, Shaw and Turvey argue against the Gestalt approach to perception, and for the ecological style of scientific enquiry proposed by Gibson. In Chap. 12, Fred Attneave makes some insightful and provocative comments on the other chapters.

Finally, Pomerantz and Kubovy present a critical overview of some fundamental issues concerning perceptual organization. Their discussion focuses on four main questions. The first is the use of the phenomenological method in the study of perception. The second is the concept of isomorphism; a term that has been used in several distinct ways. Third, various interpretations of the principle of Pragnanz are explored. And fourth, the authors examine the question of part-whole relationships; extending this discussion to the Gibsonian concept of "direct perception" and to a comparison of hypothesized general-purpose and special-purpose mechanisms in perception.

One noteworthy feature of the volume is the inclusion of two major contributions on organizational processes in hearing. This represents a departure from traditional treatments of perceptual organization, which have overwhelmingly emphasized visual phenomena. The reason for this new trend is not hard to find. Auditory phenomena are perceptually very impoverished if they are not time varying; yet until very recently it has been extremely difficult to generate complex time-varying auditory stimuli with flexibility and percision. Technological developments have now removed these difficulties; and as a result, interest in higher-level organizational processes in hearing is developing rapidly.

The two chapters on hearing are fine examples of work in this field. Michael Kubovy presents a beautifully written account of his work on pitch segregation resulting from inter-aural difference cues. In general, the experiments employ the following paradigm. A set of simultaneous and continuous sine-wave tones is presented to both ears. One of these tones in one ear is phase shifted relative to its counterpart in the opposite ear. When the tones are phase shifted in sequence a melody is heard which corresponds to the shifted tones. However, the melody is not detectable when the stimulus is presented to either ear alone. In the second part of his chapter, Kubovy presents a heuristic for drawing analogies between visual and auditory perception. Basically this heuristic rests on a distinction between "dispensable" and indispensable" attributes. Kubovy argues that time is an indispensable attribute in both modalities; however space is a second indispensable attribute in the visual mode, but frequency rather than space is indispensable in the auditory mode. Arguments for this heuristic are based both on general considerations and on recent experimental evidence.

Albert Bregman's chapter is addressed to the following issue. In our natural environment, the influences of all sound sources are summed in the pressure wave that reaches the ear. A major task that the auditory system must perform is to recover from the input descriptions of the sources that have, in combination, produced this input. Bregman argues that this is achieved by using heuristic rules that capitalize on features of the input which tend to occur whenever a number of distinct sources are involved. Various Gestalt principles such as closure, proximity and common fate, are proposed as such heuristic rules. Bregman documents his arguments with findings from his own and other laboratories.

In summary, this is an excellent volume. It presents the reader with a wealth of findings, and of thoughtful and provocative arguments. It is strongly recommended for all those with an interest in perceptual processing.

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