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A review of

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In the Mind's Eye: Julian Hochberg on the Perception of Pictures, Films, and the World

by Mary A. Peterson, Barbara Gillam, and H. A. Sedgwick (Eds.)

New York: Oxford University Press, 2007. 634 pp. ISBN 978-0-19-517691-9. $75.00

Reviewed by

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In the Mind's Eye: Julian Hochberg on the Perception of Pictures, Films, and the World is a presentation of writings of the important American psychologist of perception, Julian Hochberg. Its publication at this time advances the deserved inscription of Hochberg's work in the annals of modern psychology. The book comes at the right time to help us keep focus on the overall development of perceptual psychology research.

The book is composed of three parts. The first part is titled Selected Papers of Julian Hochberg; the second part is Commentaries on Julian Hochberg's Work. The third is a much smaller part, Julian Hochberg: Biography and Bibliography, which contains a biography of Hochberg a

page and a half long and a bibliography of his publications, approximately six pages in length.

Where does Hochberg's work stand in relation to the development of psychological perceptual research? The clearest answer to this question in my mind is provided by one of the editors of the book, Mary A. Peterson:

> Julian Hochberg has long maintained that visual perception is a *piecemeal*, *schematic*, and *constructive* process, subject to influences from the viewer's perceptual intentions and expectations. Hochberg concluded that a global simplicity metric could not succeed as an account of human perception; instead, he proposed that the depth cues at the individual corners extend their influence locally, and that the 3D percept results from a process that combines the local cues (i.e., the pieces) using limited consistency constraints. Perceived structure is not a detailed, high-fidelity image of the input. (pp. 419–420)

In attending to the book's structure, I will address three paramount themes of Hochberg's research presented in it: (a) his work on pictures and film, (b) his critiques of the Gestalt position on perception, and (c) his work on the intentionality of perception. Through this approach, I am enabled to focus on points of Hochberg's work and relevant commentary by the contributors in this voluminous and quite detailed book.

Pictures and Film

Hochberg's visual research interests have encompassed pictorial works of art, pictures, and film. Significantly, his elucidations of both visual operations of focusing and peripheral vision and also the perceptual registration of edges have informed those processes in the experiencing of pictorial works of art. A particularly felicitous as well as perceptually enlightening example of Hochberg's presentation in this respect is his discussion of “Rembrandt's solution: separate painting for foveal and peripheral gaze” (pp. 261–262) in his very important Chapter 15. Hochberg informs us,

Chiaroscuro, the distribution of light and dark for purposes of composition, emphasis, and contrast, was brought in many of Rembrandt's paintings to a form of spotlight treatment that I will call focal chiaroscuro because it provides a very few regions of the canvas—focal regions—to which the viewer is almost forced to pay particular attention. (p. 261)

When the gaze is in fact restricted to a focal region, the entire picture looks uniformly detailed, inasmuch as the focal regions are executed with normal detail, and the parts that are sketchy, outside those regions, are not brought to foveal vision, which alone could show them to be sketchy. (p. 262)

The lover of Rembrandt's appealing and profound portraits finds in these perceptual psychological renditions of the esthetic experiences by Hochberg visual truths that enhance the esthetic experiences. In addition to his clarifications of a focal chiaroscuro and the focused gaze, Hochberg refers to *sfumato*, a technique anticipatory of Rembrandt's use of chiaroscuro.

Sfumato, a technique introduced by Leonardo da Vinci, involves blurring the edges of represented objects. I believe that such blurring serves at once to make the discrepancy between picture and real edge less determinate; to simulate the blurring that must normally prevail in the retinal image of a horizon. (p. 247)

Hochberg continues that most importantly,

because *the blur does not look different from what an object's sharp edge or horizon would look like when glimpsed peripherally, the viewer can obtain a realistic picture in view only by keeping his or her eyes away from the blurred outlines*. (p. 248)

Sedgwick in Chapter 39 recounts Hochberg's discussion of alternative ways that artists deal with problems of perspective. Sedgwick also reports how Hochberg shows how Matisse uses the Gestalt principle of good continuation to deliberately flatten the perceived depth—and he refers to Hochberg's analysis of Matisse's techniques as “fascinating” (p. 576). I agree with him. Sedgwick continues his attention to Hochberg's analyses with Hochberg's descriptions of Cezanne's flattening of his pictures through deliberate application of background color within the object's outline. I affirm Hochberg's analyses here as rich and as facilitative toward the enhancement of the aesthetic experiences of paintings.

Sedgwick gives us a Hochberg strategy for the experiencing of a tridimensional scene in a painting. He quotes Hochberg as suggesting that a picture is seen as a tridimensional scene by averting the gaze from the edges of a picture—perhaps, at least, through suppression of one edge of the picture (p. 574). This strategy, Sedgwick tells us, is based on the fact, “as Gibson (1951) had noted, [that] one salient difference between pictures and real scenes is that a picture is delimited by its edges, which specify that the picture is actually a flat surface” (p. 574). Hochberg's research on visual art and picture perception should be incorporated within art education curricula. Hochberg, moreover, points out that successful line drawings can inform us about the ways in which the world itself is perceived and encoded. “That makes the study of pictorial art important to the perceptual psychologist” (Hochberg, 2007, p. 166). Drawings and paintings, therefore, as much contribute to the understanding of visual perceptual processes as does visual perceptual research help to further the aesthetics of visual art. Zygmunt Pizlo in Chapter 34 discusses the results of Hochberg and Brooks's research on the perception of 3D objects from pictures (presented in Chapter 6).

> These results strongly suggest that *perceiving 3D objects from pictures is innate and that this perceptual ability involves the same mechanisms as perceiving real 3D objects*. Finally, because perceiving 3D objects from 2D images does involve a priori simplicity constraints, it is reasonable to claim that *the same set of simplicity constraints is involved in perceiving 3D scenes as in perceiving such scenes from pictures*. (p. 530)

The visual experiences of pictorial art and the working-out of visual perceptual psychology, indeed, are cognate to each other. No less impressively, Hochberg's studies on film, Chapters 14 and 20, have contributed to the cross-benefaction of both. Ed S. Tan in Chapter 38 judges that Hochberg and Brooks's work on film has defined the ecology of cinematic perception, “which differs from the ecology of the real world” (p. 568). Clarification of differences benefits mutually those items that are being compared.

Framing the Rules of Perception

The focuses here are the relationship of Hochberg's work to the Gestaltist work on perception and Hochberg's critique of Gestaltist positions. Zygmunt Pizlo declares in his Chapter 34, “Professor Hochberg built a bridge between Gestalt psychology and modern contemporary cognitive psychology by clarifying Gestalt ideas, by reformulating and by elaborating them” (p. 530). Professor Hochberg's bridge, however, was not a velvet revolution. To the point of that statement is the following quotation from Hochberg, “The mental structures of the Gestalt phenomena are therefore better subsumed under the general Helmholtzian rubric than they were explained by Gestalt theory” (p. 295). Wertheimer, Köhler, and Koffka, I am sure, stirred in their graves when Hochberg penned that thought. For the sake of a review that investigates as much as it appraises, I will go into some detail here.

Hochberg acknowledges the contributions of the Gestaltist position to the psychology of perception.

> The Gestaltists were surely right in that we respond at an early level to configurations and not just to points. The proposed laws of organization and their contribution to object structure are increasingly viable. *But it is wrong to consider each full configuration—each object—as reflecting a unitary infrastructure.* (p. 399)

In line with his long-time maintained assertion that “visual perception is a *piecemeal*, *schematic*, and *constructive* process” (in Mary A. Peterson's Chapter 22, p. 419), Hochberg points out that the Gestaltist-claimed irreducibility of figure–ground in perceptual experience actually depends “on component elements of shaped edges which face one way or the other and are subject to implicit learning” (p. 399)—the “non-unitary infrastructure”? Additionally, the structure perceived depends on where one chooses to attend.

With respect to Gestaltist-proposed laws of organization, Hochberg offers a “simplicity principle” (another law of organization?) that could sidestep those laws without necessarily appealing to any learned

associations. He adduces as an example of what would be workable here, a “much more complex simplicity principle [as advocated by Emanuel Leeuwenberg].” The apparent oxymoron presented is clarified in his Note 2 with reference to “multiple grounds for simplicity” (p. 409).

In terms of this “simplicity principle,” James E. Cutting in Chapter 30 declares, “[Hochberg] was the first to quantify the idea of *Prägnanz*, or figural goodness, as simplicity and apply it to perception. Hochberg later characterized this as a perceptual rule: `We perceive whatever objects or scene would most simply or economically fit the sensory pattern'” (pp. 496–497).

Another consideration of Hochberg's relationship to Gestaltism is his judgment of a major concept of Gestalt psychologists that has been controversial since its introduction into psychological theory. This is the concept of *isomorphism*. An early and high-profile understanding of isomorphism, originating from Köhler, is the presupposition of a “brain field.” Hochberg joined the fray in this controversy: for overall understanding of the issues involved, his words on it as well as the Gestaltist positions on it in its beginnings and as of now should be presented.

Hochberg states, “in passing, let us note… that we simply cannot retain the Gestaltists' model of the nervous system, in which object properties are explained in terms of simultaneous interactions that occur within some hypothesized field within the brain” (p. 182). The year of the original publication of this Chapter 12 within which this statement is made is 1972. Elsewhere in that Chapter 12 (pp. 152 and 172), and in the 1974 first-published Chapter 13 (p. 191), Hochberg refers to “brain field” as if it were unequivocally Gestalt doctrine.

It was not unequivocally Gestalt doctrine. The Gestalt psychologists Abraham S. Luchins and Edith H. Luchins (n.d.) have reported that in 1968 (four years before Hochberg's comment on “the Gestaltists' model of the nervous system” above) the important Gestalt social

psychologist Solomon E. Asch concluded about Gestalt theory and its isomorphism,

> It is appropriate to stress that gestalt theory is not a completed system, that many of the issues it raised await resolution, and that it might be best described as a program of investigation or a region of problems. Thus, there is as yet little understanding of the physiological foundations that gestalt theory sought for psychology, and the postulate of isomorphism remains a heuristic principle. (p. 173)

Luchins and Luchins, furthermore, cite a “comparison of two conceptions of isomorphism (cf. Scheerer, 1954)”; namely, Köhler's that refers to patterns of the “brain field's physiological processes”, and Wertheimer's that is concerned with the “relationship between organization of the phenomenal field and that of the geographical field” (n.d.-a). Luchins and Luchins conclude, “It seems that there is more than one concept of isomorphism in Gestalt theory. Nor is it easy to distinguish clearly between the contributions of one or the other of the founders” (n.d.-b).

These reflections by Gestaltists on their system are circumspect, and the presented disparate concepts of isomorphism predate Hochberg's 1972 article (Chapter 12 in this book). Isomorphism was not an unequivocally agreed-upon Gestalt doctrine. Hochberg's presentation might be judged as perpetuating the old chestnut that the concept of isomorphism is presented by the Gestaltists unequivocally simply as a “brain field.” There is no excuse for it. Mary Henle (1977, 1984) in two important articles has made this clear.

Stephen E. Palmer (2000) in the APA *Encyclopedia of Psychology* in his discussion of perceptual organization and Gestaltist isomorphism wrote, “Although subsequent physiological results discredited the brain-field conjecture, the more abstract idea of a physical Gestalt, a dynamical physical system that reaches equilibrium in minimum energy configurations, is compatible with modern investigations of recurrent neural networks” (p. 96). The issue of the Gestaltist concept of isomorphism is still alive. Also alive is the cogency of the school of Gestalt psychology.

Hochberg has undeniably added to the understanding of Gestalt laws of perceptual organization. But it is in the light of both the history of the isomorphism concept and in the context of developing neuropsychological research that issues of isomorphism and organization require a revisiting.

The Intentionality of Perception

Hochberg's Chapter 11 is titled “Reading as Intentional Behavior.” The title and content of that chapter solicit comments on intentionality implicitly and explicitly referred to in this book. A vehicle of intentionality to which Hochberg refers is the saccade. The endpoints of saccadic movement

> are decided *before* the movement is initiated (i.e., saccades are *ballistic* movements), the content of each glance is always, in a sense, an answer to a question about what will be seen if some specific part of the peripherally viewed scene is brought to the fovea. (p. 142)

Hochberg further on in the book makes reference to these “ballistic saccades” as “a rapid series of discrete overlapping glances” through which “we gain an apparently coherent and continuous view of the world” (p. 397). They are voluntary in character and reflective of intentionality.

We are informed by Hochberg that “the human brain has top-down, forward-looking priorities. [Visual signals from the eye and geniculate] are modified by signals from higher cortical levels, including the prefrontal cortex, which is the topmost and most-anticipatory region” (pp. 399–400). Citing research, Hochberg states that saccades occur only after shifts of attention. Hochberg, moreover, refers to “purposeful shifts of attention” in the context of the citation.

Hochberg refers to the direction of these saccades by “a perceptual question or an anticipation about what information can be found” (p. 400). He references this question to earlier research of his own published in 1968 and 1970, to a 1970 coauthored publication with

Brooks (1970), and to various other studies of more recent publication. A phrase employed here by Hochberg is “their owner's *planned perceptual actions*” of saccadic eye movements (p. 400).

The quotations from the book above on “top-down and forward-looking priorities of the human brain with its modification by signals from higher cortical levels,” “perceptual question or an anticipation,” and “planned perceptual actions” all directly or indirectly testify to awareness, consciousness, and intentionality.

There are further considerations; in the discussion of the determinants of salience and the range of effective window sizes and durations for various determinants of perceived structure, Hochberg suggests that “viewer's goals” and “narrative engagement” are implicated. He concludes this section of the chapter by stating that “researching such problems demands very different lines of inquiry, to the extent that it can be done at all” (p. 406).

Investigations of research participants' goals and the narrative engagement of what is being perceptually experienced can be done and are being done. These dimensions are much less available to traditionally understood experimental controls, but they are accessible to researchers whose program of investigation employs the qualitative approach. Hochberg's phrase “to the extent that it can be done at all” is gratuitous. From what position does he say this? From the position that only controlled experimentation yields valid data collection? Cannot the “very different lines of inquiry” to which he makes allusion be lines of inquiry different from controlled experimentation?

Earlier in the book in critical assessment of the traditional experimental apparatus, the tachistoscope, Hochberg declares,

> However, because they appear out of context, are usually not programmed by the subject's eye movements, and demand a response (namely, *What word do you see?*) that is very uncharacteristic of the reading process, the relevance of any tachistoscopic experiment to the normal reading process must always be questioned. (p. 129)

The logic of Hochberg's assessment of procedures employing the tachistoscope in reading and, by implication, other exercises of vision

is extendable to the use of all apparatuses in visual perceptual experimentation. Qualitative research paradigms offer procedures of empirical investigation that pick up on the molar plane what is not accessible on the molecular level. One especially relevant methodology on perception is that of phenomenological psychology as it has been developed by Amedeo P. Giorgi (2003).

In conclusion, the three paramount themes in *In the Mind's Eye* are undertaken with seriousness and depth. The treatment of the first theme, pictures and film, promotes the study of art and film in tandem with perceptual psychology. The results of such studies disclose reciprocal benefit. The treatment of the second theme, framing the rules of perception, is misleading in its discussion of the equivocality of the Gestaltist concept of isomorphism. The documentation offered above on this point is irrefutable. The treatment of the third theme, the intentionality of perception, is interesting for the reason that it brings Hochberg to the threshold of a qualitative line of inquiry that would do justice to the molar dimensions of perception and its organization. Hochberg, however, does not cross the threshold.

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1554-0138

January 9, 2008, Vol. 53, Release 2, Article 16

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