

Book Reviews - Buchbesprechungen

Wolfgang METZGER (1936/2006): Laws of Seeing. Cambridge: MIT Press. English translation of “Gesetze des Sehens” (1936, first German edition), by Lothar Spillmann, Steven Lehar, Mimsey Stromeyer, and Michael Wertheimer, 203 pages, € 40,90; USD 48,00.

In several letters written to Max Wertheimer dating from 1934-1937, Wolfgang Metzger informed his exiled teacher about the project he spent his ‘free hours in the last two years’ on a popularly written little book (‘gemeinverständliches Büchlein’) on perception, which was published in 1936 (see Walter, 1998, 38-43). In one of the letters Metzger noted that the book was selling well and that there were already several inquiries about its translation. Prentice (1956) wrote that an English translation project failed due to the advent of World War II. In the end, it took 70 years for this translation to be finally realized, more than a quarter of a century after Metzger’s death in 1979. The ‘little book’ was based primarily on essays he wrote for a journal published by a natural science museum which were then revised and expanded for publication. In the preface, Metzger stated that his purpose was ‘to convey an impression of the revolution in fundamental theoretical concepts, based on research in psychology, that has occurred and is still under way’. The revolution he refers to is the Gestalt theory as originally initiated by Wertheimer. The main theoretical import of the book, reflected in its very title (‘Laws of seeing’), is the explication of the Gestalt laws of organization and their application to various perceptual phenomena. The historical context of the book and its contemporary significance are discussed by Spillmann (1999).

The text consists of an introductory chapter presenting a brief overview of the history of vision theory, eleven chapters devoted to various perceptual topics, and a closing chapter on laws of seeing and laws of nature. Although the perceptual phenomena treated in the book are predominantly visual, haptic perception is also addressed, as well as a few auditory examples. The work mostly covers human adult perception, but developmental aspects and non-human perception are discussed as well. The visual phenomena studied include ambiguous figures, grouping, camouflage, lightness perception, perceived depth in images through perspective and shading, occlusion, transparency, and motion illusions. The English text reads fluently, due to the dedicated efforts of the team of translators.

In the first three chapters – entitled ‘Ambiguous figures in our daily environment’, ‘Visible and invisible forms’, and ‘Of groups and borders’ – Metzger uses a wealth of examples to demonstrate that the perceived structure of visual stimuli is strongly underdetermined by the optical input. For example, he shows how a very simple stimulus configuration, which is readily perceived as consisting of two overlapping circles, could in principle be perceptually organized in a variety of additional ways. However, the other potential organizations are very hard or impossible to actually see and we are essentially blind to them, although geometrically they are just as present in the stimulus as the organization we are aware of. Based on such examples he argues that ‘... the stimulus configuration is extraordinarily ambiguous, although we may not be

aware of that ambiguity' (17)', and that '... we are almost unanimously of the opinion that there is no other alternative organization than the one we see, and do not suspect the miracle that occurs in our senses at every moment' (43). That miracle, the fact that what we usually perceive is one particular organization among the infinitely many possible ones 'must be due, therefore, to the *laws of vision* themselves, according to which everything seen organizes itself and therefore receives its form. It is on these laws that we wish to focus' (17). These are the Gestalt laws of closure, similarity, proximity, symmetry, good continuation, belongingness, common fate, good Gestalt, Prägnanz and others.

The breadth, comprehensiveness, and vigor with which Metzger applies these concepts to various perceptual phenomena throughout the book may surprise contemporary vision researchers who are not well-acquainted with this approach. To give some examples, in addition to accounting for the perceived organization of various simple patterns, the Gestalt laws are used to explain why the same structures may be differently organized in vision and touch, why some drawings look two-dimensional and others three-dimensional, why certain figures appear transparent and others opaque, why some figures which have equal physical luminance may appear to have different perceived lightness, what forms are seen under unfavorable observation conditions (such as small scale, low contrast, or in peripheral vision), how the rules of successful camouflage help animals not to be seen, why the same luminance distribution may appear as flat, as convex, or as a hole, which objects are seen as moving and which as stationary in certain circumstances, etc.

Metzger wrote to Wertheimer that, in composing his book '... it took great effort to express the difficult things so simply that one could provide real understanding, without at the same time bending the facts, making them simpler than they really are' (Walter, 1998, 43, my translation). Metzger's efforts in this regard were well spent, for the book reveals him as a master of didactic exposition. Colorful, well-chosen, and memorable examples abound throughout. For example, after describing the interesting laboratory finding that a dark gray disk, when well illuminated, may reflect more light than a poorly illuminated white disk, and yet one appears gray and the other white, Metzger illustrates this through a real-life example by relating how he had 'an unforgettable memory of the class when our drawing instructor explained to us, 13- to 14-year-old boys that to produce the impression of a black suit correctly, one must paint the black cloth facing toward the window brighter than the snow white collar on the shadowed side' (101). Or, after providing the numerical values of binocular depth thresholds for various distances from the observer, he vividly expresses the fact that depth perception does not reduce to stereoscopy (of particular significance to him personally, because he lost vision in one eye in World War I) by noting that 'if space perception depended solely on the interaction between the [two] eyes, the most corpulent gentleman at 50 m, the most impressive country estate at 500 m, and also the mightiest mountain range and the most powerful thunder cloud beyond 1000 m should look no different than cardboard scenery' (92). In addition to the author's adept writing style, another strength of the book are the almost 200 illustrations in about as many pages, many of which may be unfamiliar to contemporary vision researchers, in particular the large number of figures illustrating animal camouflage (although the technical quality of some of the original 1936 camouflage photographs is less than perfect).

The basic aspects of Gestalt laws of organization are generally well known among contemporary vision researchers, since they are discussed in most contemporary introductory perception textbooks. Yet many issues about them still remain to be worked out after all these years, and the English translation of Metzger's book may provide new motivation for this task. For example, just how many laws are there? Metzger did not provide a definitive list, and under the heading 'Gestalt laws' the book index lists 18 items; even more formulations appear in the text, such as the 'law of balanced form' or the 'law of the unity of structure'. Palmer (1999) suggested still more laws. Some of the listed laws, such as 'the law of good Gestalt', 'the law of greatest order', or 'the law of Prägnanz' are more general than the others, and appear to be different labels for the same generalization. However, the lower generality laws, such as the laws of proximity, similarity, or good continuation, may actually be more useful, in that it is more clear whether they are applicable to concrete stimuli, whereas their generalizations, which state that the preferred organizations will be 'simple', 'orderly', 'good', or 'prägnant' (20), are tantalizingly suggestive but are not easy to conceptually pin down, specify, and operationalize.

A separate issue is the question how the effects of different laws are combined. There is no problem when several laws favor the same organization and mutually strengthen their effects, but what happens when they diverge, one favoring one organization and the other another? Metzger presented some relevant examples and described the corresponding perceptual outcomes, but the general problem remains how to justify theoretically the different weights of different principles in different circumstances. With respect to this issue, Palmer (1999) claimed that the Gestalt principles are '*ceteris paribus*' rules that fail to provide clear predictions when different laws are in conflict.

In the last chapter, Metzger suggests still higher levels of generalization of Gestalt principles, going beyond perception and applying to cognition, memory, and problem solving, and provided corresponding examples of professional decision making by military commanders, judges, historians, and geologists (182). To what extent such more sweeping generalizations are felicitous is debatable. As a comparison, when in physics the claim is made that apparently different phenomena, such as the motions of the falling apple and of the orbiting moon, are accountable as special instances of the same, general law of gravity, or that both the behavior of light and matter is governed by the principle of Least Action, such claims are backed up by mathematical formulas, logical deductions, and quantitative measurements. The purported generality of Gestalt laws still awaits such backing.

Finally, there is also the question of the origin of the laws. Where do they come from? Why is it that when we observe simple drawings on paper, we experience wholes based on principles of proximity, similarity, continuity, common fate etc, as figures upon a ground? One possibility, not favored by Metzger, is that this feature of our perceptual functioning is learned, that is, ultimately due to the fact that from birth on we are confronted with objects that are constituted from parts which are located next to each other and are similarly colored, and have continuous contours and move together as wholes, in front of stationary backgrounds. Thus Rock (1975), after a thorough exposition of Gestalt laws, argued that they could

be acquired, and grounded on unconscious inferences. However, although Metzger did acknowledge the role of experience in perception, he claimed that ‘... the fundamental laws of perception are present before the accumulation of this stock of experience’, and that ‘... without the existence and stability of these laws, the store of past experience could neither be collected nor utilized’ (180). The issue of the origin of the Gestalt laws is, thus, just another battleground in the perennial fertile/futile conflict of rationalism vs. empiricism, nature vs. nurture, or, in a new incarnation in vision science, genetic determination of the structure of neuronal receptive fields vs. Bayesian exploitation of statistical environmental regularities. Metzger himself showed an ambiguous attitude towards physiological explanations of perceptual phenomena. He found that much of physiology known in his time was unusable for such purposes and had even ‘obstructed and diverted the discovery and recognition of the actual laws of seeing’ (188), and claimed that ‘with our perceptual theory we do not bow to physiology, but rather we present challenges to it’ (197). However, Metzger clearly accepted the eventual relevance of such data in the search for physiological laws corresponding to Gestalt principles which, he claimed, were mental laws.

In a letter to Wertheimer from March 1937, Metzger wrote that in spite of many flattering comments he was not quite satisfied with certain passages in the book, that he already started work on the second edition, and that he would very much like to receive Wertheimer’s comments, which were more important to him than all the others, even if they should turn out to be not that flattering (Walter 1998, 43). No letter from Wertheimer with such comments has as yet been published. Metzger continued work on the book for many years. Its second edition, published in 1953, grew to 470 pages. In a review, Prentice (1956) wrote that ‘... it is in certain ways the best available book on visual perception Readers who have been taking their visual world for granted will never do so again, and even some who have studied visual problems for a long time may find new kinds of question arising as they read ... I wish it were available to every American student of perception’. The third and final German edition, published in 1975, increased to 676 pages. It is an extraordinary book, ranking with the best large-scale overview volumes in the field. The only comparable work in the recent English language perception literature that I am aware of, in terms of scope and approach (and the fact that it is single-authored), is Palmer’s (1999) *Vision Science*, but the two books differ in a number of ways. The publication of the English translation of the first edition is a very welcome event, but the continued unavailability of the third edition (which has been out of print for some time) is, I find, a serious loss for the advancement of the science of perception. In addition, it might also be the time to consider the translation into English of Metzger’s other magnum opus, *Psychology, The Development of its Basic Assumptions since the Introduction of the Experimental Method*, a work wider in scope and different in tone than ‘Laws of Seeing’, partly philosophical in approach, and almost unique in content in the psychological literature (see Boudewijnse 2004). Finally, it should be stressed that Metzger’s books are only a small sample of high-quality early German perception work still largely unknown to the international scientific community (for some examples see Gilchrist, 2006, and Todorović, 1996).

It is a rare event when a group of enthusiastic researchers collaborate with a willing publisher to resurrect from undeserved oblivion a scientific book from many decades ago. It is true that, given its original year of publication, Metzger's work is rather dated in several respects. Furthermore, one should not expect to find in it descriptions of technical details of experimental arrangements, result graphs, or significance tests. Nevertheless, there are several types of readers to whom the book has much to offer, in addition to scholars interested in the history of perception studies. Thus vision scientists who consider themselves to some extent as neo-Gestaltists should be delighted to find a new source of inspiration. Other researchers may be intrigued to check out a vigorously argued general approach to perceptual phenomena. Teachers of introductory perception courses can expect to find a valuable source of fresh material. And readers who are not perception experts but are curious about it will benefit from a mainly jargon-free text, rich in examples and practical applications, by a skillful writer passionate about his subject matter. If your reading appetite is whetted, you can find more information about the book in the introduction by Lothar Spillmann, available as a free download at: <http://mitpress.mit.edu/books/chapters/0262134675intro1.pdf>

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