Objects, Objects Everywhere, but What Are We to Think?

A review of

Objects and Attention
by Brian J. Scholl (Ed.)

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Reviewed by

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Scholl brings together in a single edited volume a diverse array of researchers to write about their work concerning how mental representations of objects in the world are established and what consequences those representations have for selective information processing. The list of contributors and their respective topics of discussion reflects the main goal of this collection, which is to highlight the fact that different research communities are raising remarkably similar questions, and that despite there being relatively little discourse between these communities, they are coming to remarkably similar conclusions. A hope was that a single volume that provides a sampling of these different research programs would engender greater interaction among the respective research communities.

The volume, which originally appeared as a special issue of the journal Cognition, includes seven papers. Five of the papers, those by Scholl (Chapter 1), Driver et al. (Chapter 3), Kubovy and Van Valkenburg (Chapter 4), Pylyshyn (Chapter 5), and Carey and Xu (Chapter 7) are review-style papers that provide an analysis and synthesis of large bodies of research, much but not all, from the laboratories of the respective authors. The remaining two chapters, those by Cavanagh, Labianca, and Thornton (Chapter 2) and Scholl, Pylyshyn, and Feldman (Chapter 6), are empirical papers that provide examples of the kind of work being conducted on the topic.

Broadly speaking, there are three domains of research that have been brought together in this work, and that might as a consequence establish greater interaction among themselves. One area is the adult literature on object-based visual attention and related issues. Even within this community there are several areas of research that have been developing somewhat separately and that could, at this point, benefit from greater integration. A second broad area is that of infant perception and how mental representations of objects, both perceptual and conceptual, develop within the early months of life. The third is the domain of auditory perception and how mental representations of auditory objects differ from and are similar to those of visual objects.

In terms of meeting the goal of forming links to the other domains of research, the chapters by Carey and Xu (Chapter 7) and Kubovy and Van Valkenburg (Chapter 4) stand out as especially shining examples. Carey and Xu first provide a clear history of the questions that have driven infant research on object representations, bringing the reader up-to-date on the most recent unresolved controversies in that field. They then note explicitly where this work has benefited from findings in the adult object-based attention literature and where, in principle, the adult literature could benefit from the findings in the infant world. The main claim from this last aspect of their discussion is that the adult world of object-based attention has been concerned with “midlevel” object representations, which is to say representations that are organized, and therefore beyond arrays of basic features, but that have not necessarily been assigned semantic value. According to Carey and Xu's analysis, young infants are excellent test beds for many of the claims raised in the adult literature, because, unlike adults, their experience of the world is almost entirely in terms of objects that are defined on the basis of spatio-temporal coherence and not kind classification; that is to say, they only seem to have midlevel object representations at that point of development. Although this characterization of infant perception remains controversial (see Chapter 7 for a review of the remaining issues) to the extent that it is supported, there appears to be an interface for mutual benefit through collaboration between the adult and infant worlds of research.
Kubovy and Van Valkenburg (Chapter 4) provide a mature analysis of the ways in which perceptual objects in the visual modality and perceptual objects in the auditory modality must differ. Specifically, they note that whereas visual object representations are framed in terms of space and time, auditory object representations are framed in terms of frequency (pitch) and time. As the field of attention research becomes increasingly concerned with understanding how information is processed selectively in cross-modal situations (e.g., see Spence & Driver, 1999, for a review), Kubovy and Van Valkenburg's analysis will become more and more relevant to that work. To date, the cross-modal work has been concerned almost exclusively with spatially defined channels of information, thus the question of “object-based attention” in this subfield has not yet been raised explicitly. Kubovy and Van Valkenburg's analysis provides an opening for broadening that focus. It also provides cautionary notice regarding the dangers of assuming that the role of “space” is equivalent across the two modalities, which much of the cross-modal work seems to assume implicitly.

Currently, the adult literature on object-based visual attention is dominated by a relatively small number of methodologies and tracks of thinking. Evidence that attention spreads within an attended object comes from many studies based on variations of the two-rectangles method presented by Egly, Driver, and Rafal (1994). Evidence that it is more difficult to divide attention across different objects than within a single object comes from variations on a task presented by Duncan (1984). Although this work has been dynamic and creative (see Chapter 1 by Scholl for a review), it may be criticized in being limited by a variations-on-a-theme approach. The chapters by Cavanagh et al. (Chapter 2), Driver et al. (Chapter 3), Pylyshyn (Chapter 5), and Scholl et al. (Chapter 6) each illustrate that the field need not be limited in this way, and that there can be and has been a diversity of thinking within the adult object-based attention/object perception literature.

Given the goals of the book, there are two aspects of the volume that may be considered weaknesses. First, a chapter on the extensive work by Nakayama and colleagues in which the fundamental role that surface representations play in visual perception would have been a useful addition (see Nakayama, He, & Shimojo, 1995, for a review of this research program). Similar to the other domains highlighted in Scholl's collection, that line of work evolved separately from the work on object-based attention but produced highly convergent findings and theoretical statements.

A second way in which the volume is weaker than it might have been is that it is missing an integrated discussion of how attention factors into all of the different domains presented. The title of the book is Objects and Attention. However, attention might be characterized as an incidental factor in much of the work discussed. An exception, of course, is Scholl's review of the adult literature that was explicitly concerned with object-based attention (Chapter 1). Also, Driver et al. (Chapter 3) articulate that attention can influence the ultimate organization of a scene and, in turn, the phenomenal experience of that scene. Cavanagh et al. (Chapter 2) is concerned with whether attention is necessary to perceive organized spatiotemporal events that depict objects (such as the tumbling motion of a pencil as it drops to the ground). Finally, the chapters that discuss multiple-object tracking experiments (Chapters 5 and 6) assert that the tracking task taps into object-based attention mechanisms. Despite these extensive references and links to attention, no attempt is made to ask whether the “attention” being referred to across these different domains is the same construct, and if so, what generalized conclusions can be drawn or what avenues for cross-domain discussion might be fruitful. This lack of discussion appears in contrast to those efforts that were made explicitly concerning what a mental representation of an object is and the degree to which the constructs being used are common across the various domains of research and which are different. This weakness, it must be noted, can only be considered a weakness in light of the equal billing of objects and attention that was granted in the title of the volume.

On the whole, this collection goes far in reaching its goal of highlighting the variety of research domains in which common questions, and in some cases common answers, concerning the mental representation of objects are being considered. The book would be an excellent source for orienting new graduate students who are interested in the mental representation of objects in any domain of research. It would also be a good text for a graduate seminar or an upper division undergraduate seminar on the topic of object perception. Even more than these uses, however, researchers already engaged in the field could benefit greatly from reading this collection as a collection, because it can serve to shake us out of the tracks (let us not say “ruts”) that the researchers tend to fall into when they are comfortable and familiar with particular methodologies or particular ways of framing questions. The writing is consistently clear across all of the chapters, and the concentration of material and analysis is consistently high. In all of these senses, this is an excellent book that is well worth reading.

References


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