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Authors

Mroczo-Wasowicz, Aleksandra
O'Callaghan, Casey
Cohen, Jonathan
et al.

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Advances in the Study of Visual and Multisensory Objects

Aleksandra Mroczko-Wąsowicz (aleksandra.mroczko-wasowicz@uw.edu.pl)

Faculty of Philosophy, University of Warsaw, Krakowskie Przedmieście 3
00-097 Warsaw, Poland

Casey O'Callaghan (casey.ocallaghan@wustl.edu)

Department of Philosophy, Washington University in St. Louis, 1 Brookings Drive
St. Louis, MO 63105, USA

Jonathan Cohen (cohen@ucsd.edu)

Department of Philosophy, UCSD, Gilman Dr. La Jolla
San Diego, CA 92161, USA

Brian J. Scholl (brian.scholl@yale.edu)

Department of Psychology, Yale University, 2 Hillhouse Ave
New Haven, CT 06511, USA

Philip J. Kellman (kellman@cognet.ucla.edu)

Department of Psychology, UCLA, 1285 Franz Hall,
Los Angeles, CA 90095, USA

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The symposium ‘Advances in the Study of Visual and Multisensory Objects’ provides convergent focus of research from a broad range of subject areas. Using both nuanced philosophical analysis and informed empirical work, the symposium offers an interdisciplinary look at different aspects of visual and multisensory objects. It integrates three methodological approaches in a well-balanced way: philosophy of perception, experimental psychology, and cognitive neuroscience. Presenting a crucial part of the forthcoming collection (A. Mroczko-Wąsowicz & R. Grush (Eds.) *Sensory Individuals: Unimodal and Multimodal Perspectives*. Oxford: OUP), the symposium focuses on specific and closely related questions.

What is the nature of the entities that we represent perceptually, and what is the nature of the attribution of sensory properties to such entities? In particular, given that perception is effected by a number of sense modalities each with very different characteristics, how are we to understand the relationship between the entities represented perceptually and the contribution of the modality or modalities involved in the perception of these items? One such relationship concerns the kinds of entities we can perceive through individual sense modalities, how they vary, and how the contributions made by different modalities are related to one another.

While it is often assumed that perceptual objects are units of perception, it remains not clear what these units are. When sitting at the campfire, are the objects the crackling sound, the smokey smell, and the flickering flame? Or is it a

higher-level entity with some number of ‘parts’ or aspects? The term ‘object’ is ambiguous and used differently depending on the discipline, theoretical perspective, and underlying ontological assumptions. Various possibilities for perceptual objects have been explored, including (but not limited to) material bodies, events, and mereological complexes.

The field progresses from treating neural sensory processes as primarily unisensory towards approaches that take perceptual processing to be modality-independent, meta-modal, and multi-modal. Even within these latter approaches sensory stimuli, properties, brain activations, and corresponding perceptual phenomenology have often been characterized in a modality-specific way. Thus, it is timely to explore the relation between those processes that are unisensory and those that are multisensory.

One of the main themes of this symposium is examining whether the basic building blocks of human perception are best understood as modality-dependent units of different forms or in terms of multimodal perceptual objects. Another theme is the relation between low-level object processing (segmentation and perceptual grouping processes) and high-level object knowledge embracing object concept and object-related expectations. A final key theme is the role that perceptual objects play as loci of unification in unimodal and multimodal perception, namely that they enable binding and integration of sensory properties to individual entities or events. The ultimate goal is to understand how it is possible that, and the extent to which, multiple sense modalities can work together to construct multisensory objects and events, which we can see, touch, hear, smell, and taste.

Contributed papers

The symposium contributors are world experts in the subject. In their papers, they combine a variety of innovative and integrative approaches to understanding object perception and related phenomena. Blending theoretical and experimental investigations on the origin and nature of human object perception and the involved interactions between different sense modalities, new and exciting ideas have been developed concerning what exactly it is that is perceived and how we perceive it.

“Visual completion and intermediate representations in object formation”, P.J. Kellman & V. Fuchser: Visual perception produces representations of complete objects despite fragmentary inputs. This paper describes recent advances in understanding contour interpolation in object formation. Persisting controversies are resolved by distinguishing two processes. An automatic contour-linking process based on well-defined geometric relationships produces an intermediate representation. A subsequent scene description process combines various scene constraints to sustain, weaken, or delete contour linkages, producing scene descriptions and perceptual experience. The paper presents data showing that this approach explains path detection, a poorly understood perceptual phenomenon, and connects it to modal and amodal completion. It also describes recent research showing that most scene constraints combine in a simple additive fashion. This research approach exemplifies the challenges of discovering intermediate representations in perception and illustrates the kinds of evidence that can reveal them. Both theories of perception emphasizing automated perceptual mechanisms and those invoking more open-ended interactions of constraints may be correct in describing different aspects of object formation.

“Figments of imagination: 'Scaffolded attention' creates non-sensory object and event representations”, J.D.K. Ongchoco & B.J. Scholl: Perception involves ‘sensory individuals’: the objects and events that we experience are a function of the incoming light and sound—and the exceptions (e.g., dreaming, hallucination) seem somehow marginal or atypical. As a result, perception is often characterized in terms of how raw sensory cues are transformed into conscious experiences with perceptual content. In contrast, ‘scaffolded attention’ is a phenomenon wherein many people perceive structured objects and events (in both space and time) that do not arise directly from sensory cues. For example, when staring at a regular grid (e.g., graph paper), the sensory cues are simply the identical squares—but people may nevertheless see a shifting array of larger structured patterns (e.g., lines or block letters). Similarly, when listening to a regular beat, people may nevertheless hear emergent rhythms. This paper focuses on scaffolded attention, and explores its power, scope, prevalence, and philosophical and psychological implications.

“Multimodal binding as mereological co-constituency”, J. Cohen: Suppose you perceive a scene

with a green triangle and a red square. It is natural to describe your visual system as responding to this scene by organizing the greenness and triangularity together into one bundle, organizing the redness and squareness together into a second bundle, and treating the two as separate. On the standard account, this “bundling”, or binding, is to be understood in terms of vision’s representing features as convergently exemplified by a single object. However, this paper will argue that this standard account, which has proven fruitful in the study of unimodal perception, does not extend smoothly to cases of multimodal perceptual binding (for which there is a large and growing body of evidence). After critically considering alternatives, this paper will put forward a novel, deflationary account in terms of mereological co-constituency, and argue that it answers to the empirically motivated needs that multimodal binding has been called on to address.

“Crossmodal identification”, C. O’Callaghan: In crossmodal identification, a subject token identifies an item perceived in one sensory modality with an item perceived in another sensory modality. Does crossmodal identification always occur in cognition, or does crossmodal identification sometimes take place in perception? This paper argues that crossmodal identification occurs in cognition, and not in perception. Nevertheless, multisensory perception is not unalive to crossmodal identity. Experimental evidence demonstrates that perception is differentially sensitive to the identity of individuals presented to distinct senses. Such sensitivity enhances recognition and improves action. This approach relies on distinguishing crossmodal identification from perceiving crossmodal identity. Perception registers crossmodal identity, but crossmodal identification as such belongs to thought.

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