What is the nature of color? And why should we care? As Jonathan Cohen points out in the introduction to his new book, color is a salient feature of our visual world that continues to stymie perceptual, physical, and philosophical accounts of it. Cohen's book is an attempt to articulate a philosophical view of color that resolves its outstanding puzzles.

In *The Red and the Real*, Cohen first articulates the standard taxonomy in colorphilosophy and then creates a new taxonomy that is, he believes, more illustrative of the central philosophical issues in color. The remainder of the book is divided into three sections. In the first section, he advocates for relationalism as the generally correct view of color. In the second section, he defends color relationalism against several types of objections, including representational, phenomenological, and ontological objections. Finally, he argues for role of functionalism as the best instance of color relationalism.

Early on, Cohen articulates the master form of the argument he wishes to make, after which he elaborates different forms of the arguments, advocates for them, and defends them against objections. The master argument centers around perceptual variation and can be loosely characterized as follows: The same object appears to have different colors to different people (and animals) in different contexts. There is no principled reason to say one of these appearance variants is veridical at the expense of another. It is better to accept all appearance variants than to arbitrarily stipulate one as veridical, and color relationalism is the best way to do this.

Anyone who has delved into color philosophy knows just how murky the waters can be. The main strength of the book is the way the tangled and complex philosophical theories of color are so clearly organized. At each juncture, Cohen takes pains to show exactly what philosophical positions are at stake. Cohen takes each philosophical position and states explicitly the conclusions that one is obligated logically to accept if one subscribes to that particular position. Over and over, he follows each philosophical argument to its logical end, thereby illustrating the philosophical costs that are accrued by adopting a particular view, costs that might not be obvious to the naive reader. This type of inferential clarification is useful in any theoretical enterprise, and Cohen succeeds admirably.

Another strength of the book is the clear way Cohen distinguishes which issues in color are germane to philosophy of perception generally and which issues are unique to color. Perceptual psychologists and neuroscientists engaged in the business of studying color are often perplexed by the fascination with which certain philosophers seem to view color. On the one hand, a neuroscientist may argue that color perception is just the same as any other perceptual process; that is, loosely speaking, a sensory signal is transduced and after varying steps of neural processing, something is perceived. It should therefore come as no surprise that the neural processes idiosyncratic to each perceptual domain yield idiosyncratic perceptual puzzles. On this view, color perception is no different than any other aspect of visual perception; nor, indeed, should it be fundamentally different than other perceptual domains (eg taste, audition, etc). Cohen situates color within relevant domains of perception and philosophy; at points he compares and contrasts color with taste perception, motion perception, fragility, solubility, temperature, and the property of 'being square' (to name a few).

In developing support for relationalism generally and role of functionalism specifically, Cohen references classic and contemporary scientific literature on color perception and color physiology. As is appropriate for a book of philosophy (as opposed to a book on perception or physiology), Cohen does not describe exhaustively the methods or experiments, but his arguments reference and are informed by the relevant scientific literature.

In the latter half of the book, Cohen elaborates and defends relationalism against representational, epistemological, and ontological objections. To do so, he advocates endorsing a distinction between fine-grained (perceptually profligate) colors and the coarse-grained colors.
referenced in everyday semantic color attribution. It is here that Cohen’s arguments are at their best and his prose at its most enjoyable. Though the complex arguments defy easy summary here, I will point out that the justification of a context-sensitive semantics for color reconciles neatly a whole slew of troublesome perceptual and philosophical puzzles. This distinction between fine-grained and coarse-grained colors is an important contribution to the field of color philosophy.

Cohen’s prose also makes for entertaining reading. Some of his sentences and phrases are delightful, as when he refers to ‘charitable’ interpretations of color primitivism (page 70), or when he writes, ‘Once again, relationalism provides a simple and well-motivated alternative to a forced choice between unpalatable alternatives’ (page 40). In addition, references to Molière and Julius Caesar pepper a topic that is unfortunately considered by some to be bland.

There is one topical omission in the book. Although Cohen’s role-functionalist view of color manages to reconcile psychophysical and phenomenological observations about color perception into a philosophical package that has the added benefit of being consistent with what we know about the natural world (no small feat), he avoids discussion of what it is really like to ‘see red’. This, as Cohen recognizes explicitly, is a topic fraught with debate. Because he views role functionalism as independent of any particular endorsement of color experience, Cohen states that he will “remain neutral on the important and controversial question of the metaphysics of color experience” (page 184). However controversial, the nature of color experience strikes me as being a topic as important (if not as amenable to analytic inquiry) as color ontology, and I was disappointed not to have it addressed in the book.

Importantly, and as is not invariably true, The Red and the Real is a worthy read whether or not one is convinced by Cohen’s arguments for color relationalism in general and role functionalism specifically. Indeed, Cohen’s descriptions are so fair and circumspect that a reader concerned with only a subset of color observations or a reader with different philosophical criteria might well find himself/herself endorsing a philosophical position other than relationalism. Cohen has described succinctly all major color philosophies, explained the relevant psychophysical and phenomenological observations, and situated them precisely where they belong. Perceptual psychologists unfamiliar with philosophy other than the armchair variety will now be conversant in the burgeoning and technical field of color philosophy.

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Looking and acting: Vision and eye movements in natural behaviour by M F Land, B W Tatler; Oxford University Press, Oxford, 288 (320) pages, £29.95 (US $59.95) paper, ISBN 978 0 19 857094 3

Natural environments contain a vast array of visual information, most of which is irrelevant to our current behavioural goals. To filter out some of this irrelevant information, we have a high resolution fovea in the centre of vision and move our eyes to point the fovea at areas of interest. One of the consequences of this architecture is that this higher resolution part of vision can only be pointed to one location at a time. When there is more than one location of interest, then these have to be looked at in turn. However, from moment-to-moment the visual environment changes as objects move and we move through the environment. In addition, as our behavioural goal changes, the objects in the environment that are important change. We move our eyes more than 150 000 times per day in a continuous sequence: eye movements are central to our visual interaction with the world and experience. As a result, the study of eye movements is a central research area in the psychology of vision.

Traditionally, much of this work has been lab based and largely examined single eye movements in isolation. As a result, we have a far from clear understanding of the extent to which information about our environment is encoded continuously to enable the guidance of action in natural behaviours. With the advent of head-mounted eye trackers and the integration of these with other movement trackers, it is now possible to examine where we look when we carry out activities in our natural environment. This new book from Mike Land and Ben Tatler addresses the interaction and coordination between eye movements, vision, and our ability to perform activities.
A lot of the work looking at this was pioneered by Mike Land and Ben Tatler; so they are well placed to write an authoritative account of the area. This new book summarises a lot of their work and that of others (notably seminal work by Dana Ballard and Mary Hayhoe) and places it in a broader context of motor control.

The book is aimed, appropriately I think, at professional or graduate-level vision scientists or advanced undergraduates coming into the area for the first time. It comprises twelve chapters organised into three sections: Preliminaries, Observations, and Commentaries. Each chapter helpfully ends with summary points, which can be used as guides to studying the book’s contents.

The first section gives the basic motivations why we might want to look at eye movements, the types of eye movements, and the nature of what drives our eyes (ie bottom–up image-based salience and/or top–down task constraints). This is an excellent grounding for what is to come. The second section is the largest section of the book and summarises work which has examined how our eyes move when we perform different types of tasks. The six chapters cover: sedentary tasks, such as reading text or music and drawing pictures; domestic activities, such as tea or sandwich making; locomotion on foot; driving; ball sports; and the impact of our gaze in a social context. These provide a comprehensive overview and synthesis of the many studies which have now been carried out in natural environments.

The final section gives, what are called, commentaries on broader issues. Consideration is given to the possible nature of the representation of our visual world. Research is outlined which suggests that rather than a rich, detailed representation of our visual world we may have a sparser, more abstracted representation. The underlying neural machinery of the coordination of action systems and associated gaze patterns is then addressed with converging evidence suggesting roles for prefrontal cortex, parietal and pre-motor areas, and the anterior cingulated cortex in the coordination of complex behaviour. Finally, the possible roles of attention, memory, scripts, and schemas are discussed with links to new ideas coming from control engineering, such as predictors and controllers.

I find the sentiment of ecological validity which permeates the book to be both commendable and compelling. The research is exceptionally interesting, but I often found it lacking when considered in a broader context, eg “so what if we move our eyes in this way when making a cup of tea”, “surprise, surprise, we look at things when we are dealing with them”. However, this book goes a long way to addressing my ‘so what’ issues. The findings from the increasing number of studies examining eye movements and natural behaviours do show that there are some general principles found across tasks which can be and are clearly drawn out here by Land and Tatler. They are placed in a broader context of a general model of motor control, involving feedforward and feedback mechanisms, which unfolds over the course of the final three Commentary chapters. I found this final section of the book to be of exceptional interest and one to which I will return to explore these issues further.

My only disappointment is a general sense from the book that studies of eye movements in a lab are essentially worthless as they will not translate to a naturalistic task and environment. I would hope (but then I would, wouldn’t I?) that this is not the case. I believe that tightly controlled behavioural experiments examining eye movements have a lot to tell us and would, perhaps, be better seen as complementary to the research laid out so ably in Looking and Acting by Land and Tatler.

Overall then, I would recommend this book to the audience it is pitched at—professionals, graduates, and undergraduates will get a chance to read a very clear and lucid account of the current state of eye-movement work in natural behaviour. I currently lead an advanced undergraduate course on ‘Active Vision’ which introduces students to eye movements from neurophysiology, to basic behavioural work, and how this translates to gaze patterns in natural environments and complex tasks. This book is most definitely a text which I will be thoroughly recommending to my students to support their studies.

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