

Jonathan Cohen

The Red and the Real: an Essay on Color Ontology.

Oxford: Oxford University Press 2009.

xvi + 260 pages

\$85.00 (cloth ISBN 978-0-19-955616-8); \$35.00 (paper ISBN 978-0-19-969223-1)

Jonathan Cohen and Mohan Matthen, eds.

Color Ontology and Color Science.

Cambridge, MA: MIT Press 2010.

xxiii + 419 pages

\$90.00 (cloth ISBN 978-0-262-01385-7); \$45.00 (paper ISBN 978-0-262-51375-3)

183 pages into *The Red and the Real: an Essay on Color Ontology*, Jonathan Cohen introduces his readers to the telepathic tomato. Like many other tomatoes, this one is round, juicy, and rich in lycopene – the chemical that gives tomatoes their bright red hue. Unlike others of its kind, however, this tomato has the powerful psychic ability to influence the perceptual experiences of anyone looking at it, forcing observers to believe that it is green, rather than red. What, then, can we say is the *real* color of the tomato? Is it really red, because we know that the tomato would ordinarily appear red, but for its paranormal trickery? Or is it really green, because that is the sensation that everyone reports when viewing it? What *are* colors, anyway – real properties of objects in the world? Or mental figments? Or both at once? Is this even the correct question to ask? How is one to know?

The Red and the Real, by Cohen, and *Color Ontology and Color Science*, an anthology edited by Cohen and Mohan Matthen, represent two recent attempts to engage questions about the philosophy of color through color science – a polyglot enterprise comprising the physics, physiology, neurology, psychology, and (sometimes) anthropology of color perception. In *The Red and the Real*, Cohen offers an extended explication and defense of his color ‘relationalism’ – an approach in which colors are understood as *constituted* by conditional relationships between objects and perceiving subjects, and which, Cohen notes, provides a coherent bridge between color philosophy and empirical color science. In *Color Ontology and Color Science*, Cohen and Matthen present a series of essays that tackle the question of what, precisely, we can conclude about the nature of color from recent scientific work on the structure of color experience. As an introduction to color philosophy, both books – taken together or singly – provide useful outlines of current debates over color ontology: whether, for example, color is real or unreal; whether it is a property of objects or of mental processes; whether the apparent ‘structure’ of color experience is a necessary or contingent aspect of color itself. Readers who are familiar with both color science and color philosophy, meanwhile, will find in these books a discussion of technical details of color science as well as theoretical concepts that bring the philosophy of color to bear more broadly on the philosophy of science, cognition, and mind. Both books provide a useful overview of major lines of thinking in present-day philosophy of color. They also indicate some major lacunae that must be addressed.

Of the two books, *Color Ontology and Color Science* necessarily provides the broadest reach. Its twelve essays by thirteen authors (Cohen and Matthen included) tackle topics from neuroscience and color blindness, to psycholinguistics and psychosemantics, to the mathematics of color and the logic of color experience. Drawing these disparate topics together is the question of the ‘structure’ of ‘color space’ – the idea that colors bear certain innate logical and empirical relationships to one another, and that these relationships can be displayed in three dimensions (e.g., one common, simple, color space can be imagined as a horizontal wheel of spectral colors, each blending into its neighbor, bisected by a perpendicular axis running from pure white to pure black, with gray in the middle. The resulting cylindrical shape – its outside curve defined by the perimeter of the colorful spectral wheel and its ends ‘capped’ by white and black – can be understood as ‘filled’ by all possible color qualia, each grading gradually into its neighbor). In order to say with confidence that a given color space presents veridical information about color in the world – that it is not simply an arbitrary conceit – we would want our color space to map in some systematic way onto objectively-identified causal agents of color experiences. Such agents could include light of specific wavelengths; electrochemical responses from the three types of wavelength sensitive cells in the retina (‘cone’ cells); and/or states of color-processing neurons in the brain. Minimally, we would want our color space to consist of non-arbitrary ordinal components – such that it offered a consistent account, e.g., of the position of colors with respect to one another. Maximally, we would want our color space to be isotropic with reality – such that, for instance, a degree of change in objective color stimulus equals an identical degree of change in position within the color space. For those who would argue that color is a singular property of objects, the fact that color qualia can be mapped into more or less intuitively and logically satisfying structural schemes suggests that they do possess a singular, underlying reality, even if it is difficult to discern what that reality is. For those who doubt that color is real, the difficulties of reconciling color science and color experience in any complete, systematic way suggests that color is just an illusion – an arbitrary mental event like ‘pain’ or ‘beauty’ rather than a property of that which necessarily *is* in the world.

Somewhat surprisingly, of the eight philosophers, four psychologists, and one practitioner and historian of color metrology who contributed to *Color Science and Color Ontology*, it is the philosophers rather than the scientists who mount the strongest defense of science as a useful tool for sorting out color ontology. Paul M. Churchland, for instance, argues that traditional color spaces do provide coherent information about what the world is like and how human beings see it. The trick is knowing how to reconcile the limited capacities of the human visual system with the surfeit of information provided by the objective world. For Matthen, similarly, color spaces are *innate* – part of the objective structure of color – but how individuals construct their own ‘maps’ of this structure is, to some degree, a matter of cultural semantics. Approaching subjective limits of vision from a somewhat different angle, Alex Byrne and David R. Hilbert argue in a coauthored essay that psychophysical models of the color spaces of color blind observers can be reliably parsed as truncations of the color spaces of ‘normal’ observers, an outcome that suggests, transitively, that such color spaces represent something real and durable about colors in the world. Austen Clarke, for his part, takes the question of information processing to an unusual limit case, arguing that the phenomenon of ‘blindsight’ – a rare condition in which patients report experiencing no visual sensations across part of their field of vision and yet can correctly ‘guess’ the colors of objects placed in their blind spot – give some weight to the reality of color as an ontologically real experience independent of mental

awareness. Jonathan Westphal, meanwhile, argues that relationships among physical colors and relationships among psychological color experiences appear to share common logical “laws” (254), which in turn suggests strongly the presence of an ontologically real structure governing both.

On the other hand, the scientists among the contributors to *Color Ontology* are less optimistic. Rolf Kuehni (historian and practitioner of color metrology), offers a sweeping and detailed survey of color order systems from the eighteenth century to the present, by way of arguing that ‘color stimulus ordering systems provide an objective order’ but that such systems ‘have no connection to humans’ (33). Don Macleod (psychologist) walks through a detailed analysis of the blooming, buzzing confusion that is the contemporary neuroscience of color, arguing that recent insights into the mechanics of the mind make the detection of a singular, neural basis for color sensations seem increasingly far-fetched. This dim prognosis is borne out by Kimberly Jameson (psychologist), who argues that if color sensations truly had a unitary neuro-physiological base, one would expect to find colors that are suspected to be neurologically-based primaries – red, green, yellow, and blue – consistently identified with singular, salient names across different linguistic communities; the fact that they are not suggests to Jameson that ‘although perceptual processing is an important constraint on color categorization and naming,’ these processes are strongly cultural as well as biological. Rainer Mausfeld (psychologist), for his part, more or less concurs with Jameson, arguing that while there are likely neurological ‘modules’ for different sorts of perceptual experiences within the brain, how we understand what we perceive – for example, the apparently ‘homogenous and autonomous’ nature of color – is largely driven by culture. Picking up aspects of Mausfeld’s argument, Reinhard Niederée (psychologist) argues that color perception is necessarily a more complicated experience than can be captured in three dimensional color space; while he is optimistic that there is, in fact, ‘a rich *internal* structure governing human color vision, still waiting to be described systematically,’ he argues thoroughly against three-dimensional color systems as ways of doing it. Finally, among the skeptical philosophers in the volume, Justin Brookes argues that research appearing to show coherent color spaces across viewers with very different visual systems – such as those studies cited by Byrne and Hilbert in their essay – are, in fact, predicated on the *a priori* assumption of a singular, coherent color space across observers, thus neutralizing the usefulness of their conclusions.

For all of the manifold, fascinating, and sometimes orthogonal viewpoints in *Color Ontology and Color Science*, even those contributors least convinced that science provides a sound means for understanding color ontology still by and large accept the ontological reality of color as a default position. (Brookes is a notable exception, adopting what appears to be an irrealist position in his fascinating suggestion that colors are mentally ‘painted in’ to perceptual experience according to what the viewer feels he or she ought to be seeing.) This is not to suggest a lacuna in the volume; rather it is to say that the primary focus of the anthology is the exploration of different modes of juggling scientific and everyday empiricism rather than limning the metaphysical questions which have historically been most central to color philosophy.

In contrast, the historical tradition of color philosophy takes center stage in *The Red and the Real* – a monograph devoted to a detailed defense of Cohen’s color ‘relationalism’ (Cohen

also presents a good summary of the main points of relationalism in an essay for *Color Ontology and Color Science*). Simply put, relationalism is the idea that colors are best understood as being constituted by relationships between particular observers and particular objects under particular circumstances, rather than as unitary properties of objects in the world. That is, as Cohen puts it, the property of ‘being red’ is more similar to the property of ‘being a sister’ or ‘being 50 meters to the left of a philosopher’ than it is to ‘being cubical’ or ‘having a mass of 50 kg.’

In fleshing out color relationalism in *The Red and the Real*, Cohen makes three distinct but interrelated arguments. First, Cohen argues against what he calls the ‘standard taxonomy’ of color philosophy, in which philosophical theories of color are classified first and foremost according to whether they take color as real or unreal. Instead Cohen promotes the advantages of a ‘revised taxonomy’ in which the crucial point about ontological theories of color is not their position on color realism, but whether they take color to be relational or non-relational – that is, whether they understand the essential nature of color as a function of interactions between subjects and objects. This ‘revised taxonomy’, argues Cohen, allows for ontological distinctions that the ‘standard taxonomy’ does not – such as, e.g., between ‘physicalism’ and ‘dispositionalism’, both of which are ‘realist’ theories of color, but only one of which (dispositionalism) requires a seeing subject. Having argued that relational/non-relational is a more versatile way of thinking about color theories than real/unreal, Cohen next takes the position that colors *are* both relational and real – a position which, he notes, accords well with both color science and everyday color experience. For example, in Cohen’s opinion, the fact that the same object can appear to be very different colors to different observers – or that two objects which appear to be the same color under one source of illumination can appear to be very different colors under different sources of illumination (for the same observer) – strongly suggests that there are no singular, monadic, veridical colors. Rather, the most parsimonious account of color ontology suggests that colors *are essentially* properties constituted by particular observers and particular objects under particular conditions. Finally, having made the case that relationalism constitutes the best way to think about colors and that colors *are* relational and real, Cohen then defends a specifically role-functional view of color against other forms of relationalism. Role functionalism – as opposed particularly to ‘realizer’ functionalism – holds that colors are higher mental functions linked to causal mechanisms, rather than the causal mechanisms themselves. (Thus, for example, ‘red,’ to the role functionalist, is *the mental state* of experiencing the color sensation, e.g., that is induced by electromagnetic radiation between roughly 650 to 750 nanometers in wavelength; and/or by staring at a greenish-blue light and then closing one’s eyes; and/or which appears logically incompatible with green; and so forth. But ‘red’ is not any or all of those things in and of themselves.)

Taken as a whole, Cohen concludes that a relationalist/realist/role-functionalist color ontology ‘provides a clear explanation of the relation between the philosophical project of attempting to specify the nature of colors, on the one hand, and the scientific project that goes by the same description, on the other’ (181). This having been said, however, the project of leveraging color science to the end of color ontology – in both *The Red and the Real* and in *Color Ontology and Color Science* – seems to be less a matter of finding the *one true* nature of color than of revitalizing the topic in general. Although the metaphysics of color is a problem with a venerable pedigree in the history of philosophy – think Aristotle, Democritus, Goethe, Peirce, Wittgenstein, *et al.* – Cohen (along with other authors in the anthology) trace their own

interest in color and color science to work in the 1980s by Hilbert and C. L. Hardin, among others. Hardin and Hilbert brought an attention to science that, in Cohen's opinion, reinvigorated the philosophy of color, which had not progressed much since early modern accounts by Galileo and Locke. 'Ideas from color science', writes Cohen, 'really did foster novel evaluations of old positions, and suggested new arguments and theories' (2009, viii). The volumes at hand are the legatees of those new arguments and theories.

The interest in the lineage of color philosophy vis-à-vis color science which runs through both volumes, however, raises a question. On the one hand, one can quibble with the notion that systematic inquiry is new to color philosophy – after all, Wittgenstein criticized Goethe in 1950 for lacking an '*experimentum crucis*' for his theory of color, while 150 years prior, Goethe himself launched a four-volume assault on Newtonian color physics drawing (in part) from Aristotle's natural philosophy of color. On the other hand, however, the loose historiography offered by Cohen and his contributors compels one to consider the quite recent vintage of the notion of color science itself. The term 'color science' is, after all, a seemingly simple container for an elaborate ontological statement – an assertion that there *is* a thing called color, and that it is amenable to study by the protean set of methods and epistemologies known as science. As recently as the middle of the nineteenth century, this was by no means a foregone conclusion. The acceptance of perception – and color perception in particular – as a proper topic for study by serious scientists was a hard won victory hashed out by scientists and philosophers (and scientist/philosophers) over the course of more than a century. As such it is perhaps no surprise that the majority of approaches to color through science yield realist ontologies (Hardin's 1986 *Color for Philosophers: Unweaving the Rainbow* is a notable exception), since the real is the traditional purview of science. And in the same way it is no surprise that relationalism (and similar approaches) seem to make such a good fit with color science, inasmuch as the dawn of the entity known as 'color science' corresponds precisely with the development of techniques for admitting the psychology and biophysics of viewership under the epistemological aegis of science. The very fact that there *is* a color science, therefore – as well as the fact that it treats color as real, and that it not only admits of, but is centered on, the interplay between subject, object, and environment – must be seen as itself the highly contingent product of a century's worth of philosophical debate (much of it admittedly quite ad hoc) over what the ontology of color *ought* to be, rather than a product of the inexorable march of science through ever-deeper layers of the mysteries of the natural world.

This brings us, in a roundabout fashion, back to the telepathic tomato. By convention, tomatoes hold a place in the philosophy of perception as representatives of irreducible sensation – of that which, regardless of its precise ontological status, nevertheless can with certainty be felt, seen, tasted, smelled, *experienced*. (Perhaps the first deployment of tomatoes in this fashion comes from Henry Habberley Price's 1932 *Perception*: 'When I see a tomato there is much I can doubt,' writes Price, 'But that something is red, and round, and there, I cannot doubt' (3).) For Cohen, the *telepathic* tomato, then, is a limit test of the reach of relational causation. One should *not*, concludes Cohen, say that the telepathic tomato *looks* green, even if it has manipulated one's perceptions to experience greenness. Rather, he argues that it would be better to say that the tomato 'looks red ... but that its non-standard telekinetic effect prevents me from apprehending the way [that the tomato] looks in respect of color to me in the circumstances' (183). Cohen acknowledges that this plea to 'non-standard' effect is more or less arbitrary, and moves quickly

from the telepathic tomato to lines of argument that are more integral to the main theses of *The Red and the Real*. Nevertheless, this distinction between that which is in bounds and that which is out of bounds – that which is ‘standard’ and that which is ‘non-standard’ – is a critical one, particularly in science, because it delimits what can and cannot be understood as viable subjects of inquiry. Indeed, the case of the *telepathic* tomato is particularly germane, insofar as mind science is a field in which serious researchers periodically entertain investigations into the neurophysical bases of telekinesis, ESP, and other sorts of ‘non-standard’ parapsychological phenomena – thus making the telepathic tomato less a figure of productive play than a distinct scientific possibility at given points in time.

The point is not to argue for the possibilities of telepathic fruit (rich though they are). Rather, it is to suggest that future discussions of color ontology might more overtly examine the warrants upon which contemporary color science – and, for that matter, phenomenal experience – rest. This, in turn, may involve abandoning some of the more ontologically secure positions afforded by scientific entities (such as wavelength and neurons) in favor of less stable, less definite, less ‘standard’ entities such as, e.g., historical contingency, cultural tropes, and linguistic commonalities. Such is the course hinted at in *Color Ontology and Color Science* particularly in the essays by Jameson, Matthen, and Kuhni, in which the very notion of color as a culturally and historically stable entity comes under scrutiny. Indeed, philosophers, far from simply taking science as a mechanism that necessarily exposes timeless ontological truth, might well inform the contours of scientific inquiries into the neuroscientific and cognitive mechanisms of human perception through a closer engagement with the history and anthropology of perception, drawing attention to what, precisely, is meant by culturally and historically situated notions like color, perception, awareness, language, and so forth. Such an engagement would allow color philosophy to move beyond a limited area of inquiry and into a more expansive ‘trading zone’ for philosophers, historians, anthropologists, and practitioners of science themselves.

One comes away from the two books at hand, then, both with an excellent feeling for contemporary color science and color philosophy and with the sense that a full account of color ontology necessarily involves more than just a consideration of the gulf between the phenomenal experience of color and the scientific understanding of the phenomenal experience of color. Both *the Red and the Real* and *Color Ontology and Color Science* will be rewarding reading not only for philosophers of color, but for philosophers of mind, of cognition, and of science (to say nothing of psychologists, neuroscientists, and historians and anthropologists of perception). Challenges that might be posed vis-à-vis the history and anthropology of color science and perception should be seen less as flaws, more as invitations to future dialogue. As a practical matter, both books, it must be said, are well-produced, with generous plates printed in supple colors – perhaps ironically, a necessity in scholarship on color, whether color is real (and relational) or not.

Michael Rossi
University of Chicago