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Colouring for and colour relationalism: A critical notice of Outside Colour (M. Chirimuuta, 2015, MIT Press)
Derek H. Brown

Outside Colour (OC) is a welcome work in history and philosophy of science. The opening chapters offer a fresh take on the history of perceptual theory and a broad overview of contemporary philosophy of colour. This is followed by the central fourth chapter, which introduces readers to a cluster of empirical data that to this point has not received explicit treatment in philosophy. The core message is that, instead of thinking of colour vision as filling in or painting the experienced world of primary qualities, we should think of colour vision as helping us to experience (and see) primary qualities. The colour visual system doesn't *colour in* an experiential world of primary qualities, it uses *colour for* the experience of those qualities. This *colouring for* approach contributes to important issues around the function of colour vision, and sets the stage for the intriguing philosophy of colour developed in the second half of the book. Central to that philosophy of colour are a pragmatic approach to visual perception (chapter 5) and an adverbialist colour ontology (chapters 6-8). The key idea of the pragmatism is that colour vision is an action-guiding capacity that makes interest-relative information about the world available to perceivers. According to the proposed adverbialism, colours are properties of colour perceivings, and colour perceivings are in turn interactions between perceivers and the objective world. The pragmatism and adverbialism are mutually-supporting and yield some interesting outcomes: when perceivings stop so do colours; a uniform object can be 'involved' with many colours, depending on the interests and activities of perceivers and peculiarities of the environment; and colour states that do not derive from 'appropriate' interactions between subjects and their environments are bad (or erroneous) colour states.

I broadly focus on two issues. In §1 I examine the significance of the novel empirical data and the *colouring for* thesis, particularly for our understanding of the function of colour vision. Here I am in broad agreement with Chirimuuta's claim that *colouring for* suggests that a function of colour vision is to help us experience/perceive and cognize about primary qualities, though I am less convinced than she that this is *the* function of colour vision. In §2 I examine her adverbialist form of colour relationalism, especially the abovementioned outcomes. One goal is argue that her relationalism, and various others that share its broad commitments, face a difficult challenge from colour mentalism.

Before proceeding I should make a brief note about colour ontology and my preferred terminology, noting that a thorough charting of the conceptual space falls well outside the scope of this work. I will make reference to three classes of colour ontologies, which vary principally in the extent to which colours are subject- or mind-involving: *colour objectivism* asserts that colours are mind-independent properties of things, *colour relationalism* asserts that colours are dependent on both the mind and objective things, and *colour mentalism* asserts that colours are purely mental. Since both relationalism and mentalism take colours to be mind-dependent they can be deemed forms of *colour subjectivism*. For simplicity I suppose that each ontology also asserts that colours are instantiated by entities in our world, yielding the following effects. For (colour) objectivism colours are instantiated by objective things, perhaps being identified with classes of spectral reflectance profiles (SSRs) or with primitive non-physical properties. For mentalism colours are properties of minds, perhaps being identified with neural features, qualia or with features of sense-data. This constraint on mentalism excludes *strict eliminativism*, according to which colours are nowhere instantiated in our world (Chalmers 2006, Pautz 2006). While this outcome is regrettable it has no substantive bearing on this discussion.

For relationalism colours are instantiated by one or more of the class of entities definitive of the relations in terms of which colours are to be understood. This deserves brief elaboration. Relational properties are sometimes attributed to one of the relevant *relata*, as when '*x* is a sister (of *y*)' is attributed to A in 'A is a sister'. At other times relational properties are more accurately attributed to the *relation* between the relevant relata, as when we speak about the relational property of 'distance' in 'the distance between A and B'. Colour relationalists have pursued both options: for example Cohen (2009) attributes relational colours to objective things like cups and tables, and in OC Chirimuuta attributes relational colours to the perceptual interactions between subjects and objective things (more on this below).

While I focus on Chirimuuta's view, it is worth having available the following contrast. Let the *objective perceptual conditions* (OPCs) of a perceptual experience be the objective things such as watches, lights and sunglasses that are the external (/extra-subjective) cause of typical colour experiences.[1] The contrasting view I

[1] Several debates are in the area. For example one might argue that the light striking the eye is the *immediate* external cause of typical colour perceptions and hence should be given priority. Alternatively, one could argue that the watch being viewed is the *relevant* external cause and hence should be given priority. Similarly, one could argue that colour *states* instead

have in mind is a form of mentalism according to which colours are properties of the mind that are typically caused by the non-mental world stimulating our visual systems, that is, by OPCs. Even at this sparse level of detail a central difference between this view and relationalism concerns the status of OPCs with regard to the nature of colours themselves: relationalists regard OPCs as not merely causes of colour experiences but as partly *constitutive* of (part of the *nature* or *identity* of) colours; by contrast mentalists relegate these entities to a *merely causal* role. That is, since for relationalists colours are relational properties between subjects and OPCs, OPCs do not merely cause colour experiences, they, and in particular the relationships they enter into with subjects, are essential to the nature (/identity/constitution) of colour. By contrast mentalists deny precisely this additional step. They agree that OPCs typically cause colour experiences, but reject the idea that OPCs and their relations to subjects are essential to the nature (/identity/constitution) of colour. For ease of reference I will refer to this as the difference between regarding OPCs as *partly constitutive* of colour instead of *merely causally* relevant to colour. It will be instructive to track this distinction throughout, for it helps focus Chirimuuta's contributions and in my view generates an important challenge for her proposal and other forms of colour relationalism (§2.5).

§1 Chirimuuta's Bedrock: Colouring in vs. colouring for.

Chirimuuta is correct to push for a closer look at the kind of empirical data (hereafter *The Data*) she surveys in Chapter 4. The data is varied, including results from numerous psychophysical paradigms and several neurological studies. The general message is that in some sense colour vision is not a stand-alone capacity but instead is used to help gather data about a host of features, including:

> segmentation of objects; perception of form or shape; grouping of objects; perception of contours; perception of texture; object detection; object identification; memorisation of objects; perception of depth; perception of the motion of complex objects; recognition of shadows (77[2]).

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of colour *experiences* are the relevant pereptual entity for the task at hand. These important debates will not significantly impact what follows.

2 All page references are to OC unless otherwise noted.

Thus for example Chirimuuta defends the *colour-as-material-assumption*[3] according to which 'the visual system operates on the assumption that colour informs us about material differences between objects' such as their respectives shapes, orientations, locations and illumination conditions (94). This is to be contrasted with the more traditional idea that the primary-qualitied world is settled by non-colour (or at least achromatic) components of our visual system, which are then 'painted in' by colour vision. The colour-as-material assumption and the accompanying *Data* suggests that at a deep level colour is 'integrated with…features, like depth and lightness' (87). I will first remark on the interpretation of *The Data* and then on the primary use to which Chirimuuta puts it, namely to inform us about the *function* of colour vision.

Consider two ways of explicating the idea that colour informs us about material differences between objects:

(a) *Experiential integration.* In visual experience colours are integrated with primary qualities. As a result subjects use experienced colour to help identify non-colour aspects of scenes.

(b) *Processing integration.* Colour vision is non-modular with regard to primary quality processing in roughly the traditional Fodorian sense of 'modular'. Thus, e.g., the colour processing system utilizes shape information received from the primary quality processing module, or the two systems work together such that colour processing routinely assists and receives assistance from primary quality processing.

Option (a) is intended to be a mundane postulate one might offer to explain *The Data.* If *The Data* suggests that we routinely use colour to help us determine shapes, illumination conditions and so on in visual scenes, then (a) is an uncontroversial means by which an explanation of this might be developed. By contrast (b) is more controversial, particularly among those who are engaged in debates about the architecture of the mind. According to (b) colour is at base level not an independently processed feature but is in critical ways processed in concert with primary quality processing. For ease of reference (b) postulates that colour perception is *non-modular* ((a) is mute on the matter).

Chirimuuta's view is closer to (b):

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[3] Chirimuuta adaptes this terminology from Kingdom (2008).

> the chromatic dimension of visual experience cannot be understood in isolation from other stimulus dimensions, and at the neurophysiological level we cannot talk about colour per se, only wavelength discrimination. The point is that colour vision cannot be isolated as a separate perceptual modality. (69-70)

She also quotes Shevell with approval:

> shape affects colour perception, but also colour affects perceived shape…studying colour in isolation, even if possible, would neglect basic properties of neural pathways as well as the full role of chromatic coding in visual perception. (p. 98; original source is Shevell 2012, A337)

One thing I would like to better understand is how much of *The Data* can be explained by (a) and how much requires (or bounds toward requiring) (b)? For example, the idea that subjects use colour to help with perceptual memory or to help identify the textures of things, or the boundaries between things, or to identify a shadow, is arguably explainable by (a) to at least some extent, and requires no recourse to the more substantive (b). The thought is that, on the assumption that in visual experience colours are integrated with primary qualities, it is not surprising to learn that improved (weakened) abilities to discern colours correlate with improved (weakened) abilities to discern various primary qualities.

Arguably the portion of *The Data* most directly relevant to the matter is the neurological. Here Chirimuuta adeptly outlines the neurological results central to the mid/late 20th century trend supporting the modularity of colour vision, and introduces unfamiliar readers to a series of more recent results which either undermine or outright overturn each one. To take one important example, in recent decades many regarded V4 as the 'colour center,' in part following the seminal work of Zeki (1978). However, '[c]urrent opinion is that V4 contributes to shape perception, visual attention, and perhaps stereopsis, and not exclusively or espcially color' (Conway 2009, 286, as quoted in OC, 72). Hence a neural area thought to be central to colour vision and broadly encapsulated from other neural processing is now thought to process information regarding a host of distinct phenomena in addition to colour.

The dialectic that results is intriguing. If one adheres to traditional modular assumptions then one is tempted to force *The Data* into interpretation (a). However, if one uses recent neuroscience as an anchor in

support of the non-modularity of colour vision (b), then the psychophysical portion of the *The Data* is available to provide further support for (b). However, it need not do so. That is, setting aside the neurological data: How much of *The Data* can be explained by (a) and how much requires (or bounds toward requiring) (b)? OC does not overtly address this question. In Chirimuuta's defense, perhaps it is enough to push us to take the non-modularity of colour vision more seriously than we have been. Difficult interpretational question such as the above emerge from this push, and can be worked through in future works.

I wish now to consider how these issues bear on Chirimuuta's *colouring for* (as opposed to *colouring in*) thesis. The idea of the *colouring for* thesis is that 'the function of color vision should not be characterized as the detection or even the perception of color…[instead c]olor [vision] helps us see *things* because adding dimensions of chromatic contrast does in fact contribute to the perception of geometric properties of objects' (76-7). Chirimuuta's aim is to infer something about the *function* of colour vision from the above evidence against the modularity of colour vision. For simplicity we thus presume (b). Consider some other contributions to debates about said function.

Chirimuuta's primary target are views such as the frugivory hypothesis (the purpose of colour vision is roughly to help subjects distinguish fruit from foliage, see, e.g., Mollon 1989) and Hilbert's view (esp. his 1992) that the function of colour vision is to isolate and track SSRs in one's environment. The latter (and the former on some renderings) is an attempt to infer colour objectivism from considerations about the function of colour vision. At first pass Chirimuuta's thought is that the *colouring-for* thesis implies that the function of colour vision is to help subjects experience (/perceive) primary qualities, and hence it is *not* to distinguish fruit from foliage or track SSRs. One imagines the following reply. Suppose colour processing is non-modular. A primary function of colour vision may still be to help us distinguish fruit from foliage or to track SSRs. It may be that the means by which this function has been achieved is by integrating colour processing with non-colour visual processing. Perhaps our colour visual systems serve their function of distinguishing fruit from foliage or tracking SSRs via processing that utilizes shape processing. Chirimuuta recognizes this (p. 98), and in response argues that our current hypotheses about the function of colour vision should be restricted to current knowledge, and current knowledge – *The Data* – contains no direct evidence in support of the frugivory or SSR-

tracking hypotheses, but does contain support for colour vision functioning as a facilitator of 'contrast enhancement' in vision (99). Hence a kind of *Occam's Razor* is invoked in support of her position.

I suspect that evolutionary theorists advocating the frugivory hypothesis will be unconvinced, given their commitment to explaining as many facets of organisms as is reasonable in terms of food and reproduction. Thus they might concede that colour vision *is* functioning as a contrast enhancer, but add that the reason it was selected and continues to be propagated was/is because contrast enhancement helped distinguish fruit from foliage (or friend from foe). On this picture colour vision serves both functions, but our best explanation as to why the contrast enhancement function continues is because the frugivory function is successfully executed. I am unsure how to adjudicate this disagreement.

Perhaps SSR-tracking advocates such as Hilbert can offer an analogous response, roughly that colour vision is so adept at contrast enhancement because that adeptness facilitates tracking SSRs. However, note that this reply is more difficult to develop. If, as we are supposing, colour vision helps us see primary qualities like shapes and depths, what motive is there to add that it also tracks SSRs? What would be the point and what is the evidence for the postulate? In the frugivory case the point and the evidence are successful survival. In the SSR-tracking case the point is supposed to be to track colours (which it so happens *are* SSR classes), and the evidence is colour constancy. The former is, all else being equal, question-begging, and Chirimuuta (2008) and others (notably Cohen 2008 and Brown 2014) have already dealt the SSR-tracking interpretation of colour constancy a heavy blow. Thus to my mind the inference from colour function to colour objectivism *is* further undermined by the *colouring-for* thesis.

The contemporary philosophical views that are most similar to Chirimuuta's are those of Hardin (esp. 1992) and Akins & Hahn (2014).[4] Hardin hypothesizes that the key functions of colour vision are to facilitate object recognition and to, via colour categorization, lessen the cognitive load on organisms in comparison to for example SSR tracking views. Regarding 'cognitive load', the thought is roughly that a visual system that 'chunks' wavelength/reflectance data into a handful of distinct categories delivers to a cognitive system a more manageable data set that a visual system that simply passes along the hundreds or thousands of

[4] Thompson (1995) is also relevant.

wavelengths/reflectances in a scene. Akins & Hahn hypothesize that colour vision functions most generally as a contrast enhancer – an inspiration for Chirimuuta's view – but also more specifically as a means of distinguishing surface variations from illuminant variations.

This is fine company to keep. However, I am curious to better understand where Chirimuuta's view departs from those of Akins & Hahn and in particular of Hardin, the latter being a well-known mentalist. I imagine Hardin granting *The Data* and arguing that it only reinforces his view that colours are mental properties that can be used to inform us of worldly shapes and distances, to glean some information (mostly relative) about environmental SSRs and illuminants, and are more generally extremely useful for cognitions about what is visually experienced (e.g., distinguishing, tracking, recognizing and recalling objects, identifying textures, forming groups). OPCs function as a critical stimulus for colour mental states, but nothing more; crucially, they are not partly constitutive of colour (see also §2). To be fair to Chirimuuta, as I read her debates about the function of colour vision do not directly inform debates about colour ontology, and I tend to agree.[5] If nothing else, Hardin is important to make the point explicit: one can accept Chirimuuta's *colouring-for* thesis without accepting her relationalism. Consider finally a much older hypothesis about colour's function.

Perhaps the earliest contribution to the issue of the function of colour vision was Aristotle's contention that colour was a *proper sensible* of vision, which roughly entails that colour is always and only experienced in (/represented by) vision. On one reading of this view the function of colour is to provide the raw materials out of which visual experiences and only visual experiences are composed.[6] From this perspective one would expect *The Data* (e.g., that colour enhances object segmentation and depth perception in vision) in no small part because one would deny the *possibility* of object segmentation and depth perception in vision without colour. What impact does this have on one's theory of visual processing? This is trickier. On one hand a non-modular approach is a natural fit: because colour is the stuff of vision one might expect colour to be integral to every

[5] To be painfully brief: colour vision could be modular and colours could be SSRs or be mental constructions; the function of colour vision could be to track SSRs and yet SSRs need not be colours (colours could still be mental constructions utilized to help track SSRs).

[6] If this hypothesis seems incredible the reader should keep in mind that blacks, whites and greys are often viewed as colours, albethem achromatic ones. Hence the proper sensible theorist invites the reader to imagine removing colours, one by one, from vision – including achromatic colours. And she hypothesizes that after completing the task nothing deserving the title 'colour experience' remains. See Macpherson (2015) for a recent critical discussion.

part of vision, including all aspects of visual processing. On the other hand, one can seek to restrict a proper sensible view to the *outputs* of perceptual processing, and argue (against Chirimuuta) that there is an intermediate stage of processing in which fully-formed colour and shape information is integrated to yield those outputs. This allows the proper sensible theorist to in effect be a bystander in interpretational debates about *The Data*. There is, however, a more important point.

Recall that according to Chirimuuta's *colouring for* thesis 'the function of color vision should not be characterized as the detection or even the perception of color.'[7] On one reading this is, as above, a rejection of the Hilbertian idea that colour function supports colour objectivism. On another reading this is a rejection of the more general idea that the function of colour vision is in part to experience/perceive colour. The proper sensible theorist is likely to find the latter puzzling. For such a theorist colour is the stuff of vision, it is the domain or the underlying structure in terms of which visual experiences are composed. A if not the function of colour vision is to make vision. This entails that colour helps us visually perceive primary-qualities central to *The Data*, but in providing this help *perceiving colour* does not get downgraded to a trivial achievement. On the contrary, perceiving colour must always remain that in terms of which all other visual functions are achieved. Even if one isn't a devout proper sensible theorist, this general idea – that perceiving colour is the achievement in terms of which all/most other visual functions are accomplished – can be preserved if not strengthened in the face of *The Data*. This does not entail that colour processing can be completed independently from the processing of other visually perceived features, it instead asserts that the aim (and achievement) of perceiving colour is critical to the aim (and achievement) of visually perceiving features like depth and scene segmentation. This issue is not directly addressed in OC and I would be intrigued to get Chirimuuta's reaction to it, particularly since the proper sensible idea is tenable even after the inference from colour function to colour objectivism has been jettisoned.

§2 Colour Subjectivisms

[7] It is worth comparing this with Akins and Hahn (2014) view, neatly sumarized in their title 'More than mere colouring.' Theirs seems to be a less extreme view than Chirimuuta's.

I now focus on the intrincate world of colour subjectivisms, referencing objectivism only where critical. While the battle between objectivism and subjectivism is important, and probably of most interest to persons working outside colour theory, there are crucial disputes within subjectivism that must be addressed, and the adverbialist form of subjectivism that Chirmuuta defends contributes to a relationalist trend that is worth examining.

As mentioned at the outset, a core distinction within subjectivism is between colour mentalism and relationalism, a central difference between them concerning the status of OPCs with regard to the nature of colours themselves: relationalists regard OPCs as not merely causes of colour experiences but as partly *constitutive* of (part of the *nature* or *identity* of) colours; by contrast mentalists relegate OPCs to a *merely causal* role.

Given subjectivism, why prefer Chirimuuta's adverbialism and relationalism more widely over mentalism? I'm not sure why we should. The general message of this section is that mentalism fares at least as well as relationalism on some parameters (§2.2-2.3) and arguably better on some others (§2.4). The discussion will be selective, for a full comparison between these views demands a lengthy study. Nonetheless, what follows is instructive, for there are difficult debates to be had within colour subjectivism, and Chirimuuta's view affords some novel locations from which to consider them.

§2.1 Chirimuuta's active colours

According to Chirimuuta '[c]olors are properties of perceptual interactions involving a perceiver (P) endowed with a spectrally discriminating visual system (V) and a stimulus (S) with spectral contrast of the sort that can be exploited by V' (140). In brief, colours are features of colour perceivings. This is a *relationalist* view because this sense of 'colour perceivings' involves perceivers standing in appropriate relations to OPCs. Given that colours are features of perceivings, colours are *fleeting*: they do not persist when perceivings cease. The token blueness that I see when I look at this cloth is no longer instantiated when I close my eyes or look away.[8] In addition, the view is committed to an interesting form of colour *pluralism*, for a uniform object can simultaneously partake in many equally-legitimate perceptual interactions that are nonetheless instantiating distinct colours. As such, a uniform object can 'have' various colours at once, though strictly speaking the

[8] And the type of blue that is instantiated ceases to be instantiated if no one else is perceiving a token of that type.

colours belong to the interaction not the object. It is fair to call this a form of adverbialism, or the *active colour view*.

As I understand Chirimuuta, the active colour view has the broad virtue of not being constrained by familiar ideas like that perceptual states are representational (chpt. 5), that colours are mere paintings onto an otherwise stable, independent primary-qualitied world (chpt. 4), and that colours have the kind of objectivity often ascribed to a common sense conception of our world (e.g., this block is blue, *simpliciter*; various chpts.). The active colour view avoids strict colour eliminativism, for our world does instantiate colours. In addition it makes the broadly enactivist/ecological idea that perceptual systems are tools for interacting with subjects' environments even more pivotal for colour than most have thought: colours arise precisely through such interactions and nowhere else; and, as discussed in §1, this class of properties is critical to our capacity to perceive the other properties experienced with vision (shapes, locations, etc.). Indeed if the active colour view is correct, one would be tempted to explore its extension to other proper sensibles. Regardless, *perceiving* instead of *perceived* &/or *perceiver* becomes a if not the core notion of perceptual theory. I proceed with a brief remark on fleeting colours.

§2.2 Fleeting colours & colour pluralism

The fleeting nature of active colours is an interesting location in conceptual space, for it is friendly to mentalism (e.g., McGilvray 1994, see OC pp. 152-3) and at odds with many relationalisms (see below). If one is a mentalist then colours are features instantiated by the mind. A natural commitment is that the mind instantiates different colours in different states. For example if blue = neural state (/quale) type B and yellow = neural state (/quale) type Y, then these colours will be instantiated only when and only where a mind is in B or Y. In this regard commitment to the fleeting nature of colours doesn't on its own favor an active colour view over mentalism – for all that's been said, OPCs may have only a causal relevance to colour ontology.

That said, there are reasons to resist fleeting colours. The idea is obviously in conflict with the stable common sense colours, though Chirimuuta seems willing to join mentalists and accept this form of error-theory. Those subjectivists who find *enduring* colours more attractive should consider a relationalism like Cohen's (2009). For Cohen objects (e.g., chairs, cups) have colours, but these colours are relational, being

defined by reference to conditions of illumination, perceptual apparati, et cetera. Thus, whereas for Chirimuuta colours qualify perceivings, for Cohen they qualify objects. As a corollary, for Cohen objects retain their colours when not perceived and so are not fleeting.

One might argue that Cohen has the advantage here, since for him the table's colour endures when the lights go out and so his relationalism is less of a departure from the stable common sense colours than is the active colour view. Such an advantage should be considered alongside the kinds of colour *pluralism* each endorses. Because for Cohen objects retain their subjective-relative colours when not perceived, Cohen's table always instantiates every colour that a potential perceiver may veridically see it to have. In the end the table seemingly instantiates every colour all over all the time. Thus, colour endurance is preserved at the cost of a massively unconstrained colour pluralism. By contrast Chirimuuta's colours come and go with perceivings. Hence her table has no colour itself, but the act of seeing the table instantiates a colour in the seeing. Colour pluralism involving the table only occcurs when there are multiple perceivings of the table that instantiate different colours, and not otherwise. The table isn't all colours all over all the time, unless all kinds of colour perceptions are being had with the table all over all the time. Chirimuuta's is therefore a somewhat less wild pluralism than Cohen's. No doubt there is much more to say about the interplay between fleeting colour and colour pluralism within relationalisms, but at first pass this strikes me as a draw.

From a slightly broader perspective, it is worth noting that mentalism can arguably avoid pluralism altogether, for it is under no obvious pressure to simultaneously ascribe the multiple colours to a single neural state (/quale). Thus if one has subjectivist leanings and wishes to avoid pluralism, mentalism has perhaps unexpected appeal.

Let me turn at last to an issue that sharply distinguishes mentalism from relationalism: the relativity of colour. The discussion will be split into a brief history, those relativities that involve perceptual error (/bad cases[9]) and those that do not.

§2.3 The relativity of colour – Brief History

Traditional Relationalism, more commonly called 'Dispositionalism', roughly asserts:

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9 I will leave this qualification implicit except where necessary to do otherwise.

x is blue iff in 'normal'(/'ideal') conditions *x* causes 'normal'(/'ideal') perceivers to experience blue[10]

The basic idea is that colour perceptions within normal situations are veridical, and despite there being variations in colour perception, these occur outside normal situations and hence are erroneous. In this picture colours are arguably enduring and pluralism is avoided. This is a simple, credible schema with which to begin developing a theory of colour.

In our current climate Traditional Relationalism is typically held to have a decisive failure:

The Ubiquity of the Relativity of Colour (*Ubiquitous Relativity*): the scope of variations in colour perception that have every right to being veridical extends well into any reasonable construal of 'normal' or 'ideal' conditions or perceivers.

Normal variations in unique hue perceptions, variations across normal changes in lighting or in surrounding objects, normal variations due to natural (arguably adaptive) differences in various species' vision systems, and so on cannot all (or even mostly) be deemed erroneous without losing the ability to coherently characterize veridical colour perception. And if all or most these variations are veridical then the framework of Traditional Relationalism sits in disrepair.

In response relationalists like Chirimuuta and Cohen have opted for a more Radical Relationalism that jettisons the 'normal'/'ideal' qualification. In Cohen's case the result is:

object *x* is blue iff in appropriate conditions *x* causes perceivers to experience blue (2009, 182)

Although I didn't find an explicit analogue statement in OC, I suspect Chirimuuta's view is roughly:

perceiving *x* is blue iff in appropriate conditions *x* contains a perceiver experiencing blue.

In this proposal the traditional appeal to 'normal' (/'ideal') conditions hasn't been erased so much as replaced with the much broader 'appropriate' conditions, the intent being to (a) allow normal variations to count as veridical, and (b) limit misperceptions to those found in the narrow 'inappropriate' class. The overall effect is that variations in colour perception are split into two classes, those that do not generate error and those that

[10] Adherents arguably include Locke, early Johnston (1992), early McGinn (1983), and Lewis (1997). Due to considerations of space I focus on connections between Chirimuuta's view and relationalist ontologies, and with regret do not discuss connections to previous incarnations of adverbialism.

do. The latter is a much slimmer class than results from the Traditional framework.[11] Members of the former are, as Cohen puts it, variations with respect to which we should be *ecumenical*. It is this category that generates pluralism for relationalism and part of what makes it a more Radical Relationalism than Traditional Dispositionalism (see also §2.5). Before discussing it directly I consider colour misperceptions.

§2.4 The relativity of colour – Error

Chirimuuta proposes a distinction between what are standardly called veridical and non-veridical colour perceptions, though I gather (chpt. 5 of OC) without appeal to a representational notion like 'veridicality'. I will follow custom and call them 'good' (veridical) and 'bad' (non-veridical) cases. The class of bad cases initially includes hallucinations, dreams, and phosphene experiences, where we experience *H-colours*, *D-colours* and *P-colours* respectively (155-6). Beyond this it includes what I will call *low contrast* scenarios, cases in which 'lighting conditions are such that no stimulus bears spectral contrast [such as when] a room is lit by a monochromatic green lamp' (181). Here we perceive *pseudo colours* (ibid).

Consider a few questions:

(1) *Underlying Motive.* What is the non-question-begging relationalist motive for the distinction in the first place? Why would Radical Relationalists bother postulating erroneous (/bad) colour perceptions, when their goal is to be *very* ecumenical, or more accurately when, because of Ubiquitous Relativity, the need to be very ecumenical is a primary motive for their view?

(2) *Specific Rendering.* Why is the distinction drawn as it is?

(3) *Non-semantic.* Is a notion like 'veridicality' plausibly avoidable in this kind of colour theory?

Unfortunately, answers to these questions (and ones in the neighborhood) are difficult to find in OC, making this one aspect of the work which readers might wish was more fully developed. Here is a brief reconstruction and evaluation.

[11] In Cohen's case (see esp. 2007) the erroneous cases are hallucinations, perceptions deriving from deviant causal chains, and mistaken judgments about perceptions – a credible but deliberately slender list. For a point of contrast, Traditional Relationalists typically deem experiences of scenes in a red twilight as erroneous, whereas Radical Relationalists classify them as veridical. (I discuss Chirimuuta's specific view shortly.)

Recall Chirimuuta's active colour proposal: '[c]olors are properties of perceptual interactions involving a perceiver (P) endowed with a spectrally discriminating visual system (V) and a stimulus (S) with spectral contrast of the sort that can be exploited by V' (140). From this we can predict a likely answer to (1): because colours are features of perceptual interactions of the above sort, when subjects seem to see colours and those sorts of interactions do not obtain we should differentiate these (bas cases) from cases in which the rights kinds of interactions do obtaing (good cases). However, to the extent that this answers (1), it does so in a question-begging manner.[12] The worry behind (1) isn't that the Radical Relationalist can't impose a division between good and bad perceptual cases. The worry stems from the fact that the *motive* for their view is that Ubiquitous Relativity forces us to be particularly liberal in what we regard as veridical perceptual cases. Indeed we are to be so liberal that a uniform object can be all colours all over at least some of the time.[13] Put one way, the worry is that if we are *that* liberal, why not include all cases in which subjects can reasonably assert that they experience colours, including hallucinations and phosphenes? This kind of pressure perhaps comes most forcefully from the mentalist, who is well-known for regarding hallucinations, phosphenes, and perhaps dreams as colour-bearing.[14] They quite rightly will not be convinced by the reply: colours are relational properties (or are features of perceptual interactions) and so hallucinations are not colour-bearing. There is much here to be discussed, and unfortunately a clear non-question-begging motive is hard to find in OC. However, let me proceed.

Suppose colours are defined as per Chirimuuta's proposal, as features of appropriate perceptual interactions. It follows that hallucinations, dreams and phosphene experiences do not have colours because appropriate perceptual interactions are not occurring. The idea behind including low contrast scenarios in the bad cases is that here the stimulus does not have 'spectral contrast of the sort that can be exploited by [the vision system].' If the function of colour vision is roughly to enhance contrast, then a stimulus that does not contain contrasts suited to a particular colour system's capacities is a stimulus that the system in some sense 'cannot see.' This is an interesting idea, in principle. However, the example offered – viewing 'a room…lit by a monochromatic green lamp' – is problematic. In general any such room will have numerous spectral contrasts

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12 Averill and Hazlatt (2010, esp. p. 143) are similarly worried about Cohen's relationalist account of error.
13 'At least some of the time' for Chirimuuta, and 'all the time' for Cohen (see §2.2).
14 It is not clear to me that the mentalist *must* be this liberal, but it is standard for her to be so.

due for example to scattering, shadowing, and surfaces with differential absorption rates for the wavelength of light being used, all of which can result in more and less intense (/bright) experiences of green and perhaps achromatic colours at different points in the scene. Perhaps a better candidate for a low-contrast scenario is viewing, through a reduction tube, a uniform surface that is evenly illuminated by a monochromatic green light.[15] But here it is natural to ask of Chirimuuta: when the subject reports seeing green, why is she seeing 'pseudo green' instead of green? There is a clear perceptual interaction happening: the stimulus is illuminated by a green light which is reflected into the vision system which 'correctly' identifies the green of the light. Why, other than that it follows from the proposed definition of colour, is the subject experiencing a pseudo colour instead of an actual colour?

Question (3) is itself difficult, for it demands an account of the kind(s) of states bad cases are that is not based in *misperception*. There are several well-known attempts to explicate 'perception' without appeal to 'representation'.[16] Typically this is done via non-representational notions like 'acquaintance' or 'perceptual relation'. A core challenge these views face is giving an account of states that are traditionally viewed as perceptual but somehow erroneous, notably of illusions and hallucinations. In rough terms, Russell's answer is that these states are in an important sense *not* erroneous, that sense-data instantiate the experienced properties. When applied to colour the result is likely mentalism, something Chirimuuta aims to avoid. She is explicit that she is 'consciously breaking away from [there being] a "common factor" in veridical, hallucinatory, and illusory experiences,' and hence endorsing some kind of perceptual disjunctivism (156). However, other than a few remarks surrounding this quote and scattered in the work no positive account is offered.

One one hand Chirimuuta cannot be faulted for simply stating her preferred view and not wading into the troubled waters that have emerged from attempts to develop such views, particularly (to my mind) when they are applied to colour. On the other hand this is a missed opportunity for a colour expert to offer insight into how to develop an account of bad colour cases. Of particular concern is the fact that Radical Relationalists appeal to common factors to motivate their departure from Traditionalists: part of the reason experiences of

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15 Strictly speaking even here it is very hard to control for contrast.
16 Russell (1912) is an obvious sources. Recent sources include Campbell (2002), Fish (2009) and Brewer (2011).

(e.g.,) nonstandardly-illuminated scenes are treated as veridical by Radicalists is because these states seem to have much in common, colourwise, with experiences of standardly-illuminated scenes. Hence the Radicalist is inviting us to explore where and how to apply common factors and to draw the good/bad distinction.[17]

§2.5 The relativity of colour – The cost of ecumenicism

The relativity of colour is perhaps the oldest and most persistent reason offered to reject colour objectivism in favour of subjectivism. Arguments to this effect are by now familiar and will not be rehearsed.[18] My goal is to briefly consider whether or not the relativity of colour and in particular Ubiquitous Relativity supports some forms of subjectivism over others. My contention is that it favours mentalism over relationalism. The interest is as above. Chirimuuta is among a growing group of Radical Relationalists. Perhaps most distinctive of her incarnation is that colours should be regarded as properties of perceptual interactions instead of as properties of perceptual objects. As I will demonstrate, the following reasoning can be adapted to either form of Radicalism, and thus the importance of the mentalism/relationalism debate is reinforced.

I now focus on the constitutive/merely causal distinction. The mentalist and relationalist agree that OPCs regularly cause subjects to enter into colour experiential states. Where they differ is over the significance of OPCs for colour ontology: the mentalist asserts that OPCs only have this causal role, whereas relationalists believe, in part *because* of this causal role, that OPCs are partly constitutive of (/part of the nature or identity of) colours. Thus the mentalist asks the general question:

> *Q:* Why suppose that an OPC's causing a colour state in a perceiver is grounds to infer that the OPC (or one or more of its constituents) has or even partly constitutes that colour?

Merely causing a colour state cannot be adequate. A standard answer is because the OPC or one of its constituents is objectively coloured, but subjectivists agree that this answer is unavailable.

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17 A useful contrast is the roughly objectivist-disjunctivist view of Kalderon (see esp. 2011)

18 An obvious recent source is Cohen's 'Master Argument' (see opening pages of his 2009), although his formulation is specifically designed to support his relationalism, as opposed to reject objectivism. Although this kind of reasoning is not emphasized in OC, nor is it dismissed or criticized. I presume Chirimuuta finds it adequately compelling.

On my reconstruction Traditional Relationalists tried to put teeth into their answer by explicating two facets of their central proposal (*x* is blue iff in 'normal'(/'ideal') conditions *x* causes 'normal'(/'ideal') perceivers to experience blue):

(1) *Robust epistemic constraints.* Special factors have to obtain in order for something's causing a colour state to imply an ascription of that colour to the cause, namely the perceiver and perceptual conditions have to be normal/ideal.

This epistemic constraint dictates when circumstances are adequate for a perceiver to learn about a thing's colour. When the constraint is met, the objective thing – a uniform book, say – gets to pronounce its uniform colour to the perceiver by producing in her the appropriate colour state. And in particular:

(2) *Colour monism.* A uniform thing's pronounced colour is specific and stable.

A thing's colour doesn't vary across perceptual conditions or perceivers. It is fixed. Variations in conditions and perceivers affect only how well the thing is able to communicate its colour to perceivers. They do not affect the thing's colour. Of course Traditional Relationalists are committed to colours only being ascertainable and specificable by reference to induced colour states. In this regard they squarely sit between objectivism and mentalism.

Although I see some intuitive appeal in this Traditional Relationalist picture, it is not obvious to me to what extent the view justifies ascribing a colour to something that causes a colour state in a subject. Regardless, to whatever extent Traditionalism justifies that ascription, that justification is rooted in (1) and (2), and thus *entirely obliterated* by the Radical Relationalist commitment to replacing (1) and (2) with virtually unconstrained parameters. Consider each in turn.

For the Radicalist the epistemic constraints for veridical(/good) colour perceptions are little beyond the need for an OPC to cause the perceiver to enter into a colour perceptual state. In Cohen's case the manner of causation must be non-deviant, a notoriously tricky notion to make precise, and deviance applies to few if any perceptual contexts encountered throughout the lives of (non-experimental) subjects. In Chirimuuta's case the manner of causation must have suitable contrasts, a notion I argued (§2.4) is achieved by virtually every perceptual context encountered throughout the lives of (non-experimental) subjects. In neither case do colour

visual systems have the character of fine-tuned instruments measuring colour, as the Traditionalist sought to maintain. Instead, colour visual systems look like instruments that react to stimuli by entering into colour states – OPCs appear to have a merely causal role.

Similarly, as already discussed, the ecumenicism of Radicalism forces upon the view an extreme form of colour pluralism. For Cohen a perceived thing has many – indeed every – colour, revealing each one in different perceptual contexts. For Chirimuuta a perceived thing, or more broadly a sample OPC, can enter into numerous perceptual interactions, each interaction potentially having a distinct colour. Hence the thing (/OPC) can be 'involved in' many colours and in theory perhaps every colour. In neither account does the object or OPC have the character of something that is pronouncing its colour to subjects, as the Traditionalist sought to maintain. Instead, objects/OPCs look like nothing more than stimuli that can induce various colour states in subjects – OPCs appear to have a merely causal role. Here is another rendering of the argument, tailored specifically to Chirimuuta's view.

A given perceiving P_1 will consist of a subject's colour perceptual state C_1 and a given OPC_1[19]. As above, *which* colour is ascribed to P_1 is seemingly decided by C_1, by whether the subject experiences blue, green, or whatever. As a result, given Ubiquitous Relativity:

(a) OPC_1 can enter into another perceiving P_2 (= C_2+ OPC_1) in which the ascribed colour is distinct and again decided by the colour state C_2; and

(b) various distinct and seemingly unrelated OPCs ($OPC_{2\text{-}n}$) can each combine with C_1 to yield a collection of perceivings {C_1 + $OPC_{2\text{-}n}$} to which the same colour is ascribed, namely the colour determined by C_1.

Given the radical relativity of colour perception conceded by Chirimuuta, the objective components of colour perceivings have nothing more than a causal role in regards to colour. They help induce various colour states in subjects, and those states determine what colour is present.

The upshot is that colour mentalism, which defines colour *solely* by reference to subjective colour perceptual states, has more explanatory purchase than Radical Relationalism. Extending colour ontology to

[19] OPC_1 will be the relevant illumination condition, SSR, etc.

include the OPCs that give rise to perceptual states is coherent, and has some appeal in Traditional Relationalism. But that appeal arguably obtains because Traditionalists sought to ground their view in a robust epistemic constraint for accurately perceiving objective things and colour monism about said things: if a uniform object's colour is only pronounced in fairly selective contexts, and when pronounced is always stable, then there is sense to the idea that the object is telling perceivers its colour, and so motive to ascribe colour to it. Given that Radicalists react to Ubiquitous Relativity by replacing these fairly constrained epistemic and ontological commitments with almost entirely unconstrained ones, Radicalists struggle to justify extending colour ontology beyond subjective perceptual states so as to include the OPCs that give rise to those states. Doing so yields an ontology with inert (disposable) constituents. By contrast the leaner mentalist ontology, which prevents OPCs from having more than causal relevance to colour ontology, better explains or fits the resulting scenarios.[20]

In reply Radical Relationalists may focus their attention elsewhere in search of a reason to prefer their view over mentalism.[21] So far as I can tell no such reasons are offered by Chirimuuta in OC.

§4 Conclusion

OC is a very enjoyable book to read. The writing is elegant and clear. It possesses a much needed and well-motivated push away from modular views of colour perception, and it joins some theorists, like Hardin and Akins & Hahn, who maintain that our account of the function of colour vision should stem from the many advantages it brings to the visual processing of fairly low-level features and the simplifications it makes for cognitions. While I agree that these advantages illuminate our unerstanding of the function of colour vision, I am less convinced that accepting them excludes wider evolutionary functions (such as helping feed) or functions deriving from the proper sensible idea that colour is definitive of vision. In addition, Chirimuta's attempt to revive a kind of colour adverbialism – in this case colours are properties of colour perceivings which in turn

[20] Similar reasoning can be applied to the other argument central to colour subjectivism, the argument from structure (Hardin 1988, Pautz 2006), but space prevents its treatment.

[21] For example Cohen (2009) argues that relationalism is less skeptical than mentalism. I do not find this objection compelling but this is not the appropriate context in which to discuss it.

are interactions between perceivers and the objective world – is refreshing. It is an underexplored kind of colour relationalism that reacts to the robust relativity of colour endorsed by many contemporary theorists in part by postulating fleeting colours. One general concern I have is that familiar motives for colour subjectivism (principally relativity and structure) may not merely provide grounds to reject objectivism, but may also favor mentalist ontologies over relationalist ones. Admittedly, my argument to this conclusion was brief, but I hope it poses a challenge Chirimuta and other relationalists are willing to tackle.

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References

Akins, K. & M. Hahn. 2014. More than mere colouring: The role of spectral information in human vision. *British Journal for the Philosophy of Science, 65:* 125-171.

Averill, A. W. and A. Hazlett. 2010. A problem for relational theories of colour. *Philosophy and Phenomenological Research, 81*(1): 140-45.

Brewer, B. 2011. *Perception and its Objects.* NY, USA: Oxford University Press.

Brown, D. 2014. Colour constancy and colour layering. *Philosophers' Imprint, 14*(16): 1-31.

Campbell, J. 2002. *Reference and Consciousness.* Oxford, UK: Oxford University Press.

Chalmers, D. 2006. Perception and the fall from Eden. In T. Gendler & J. Hawthorne, eds., 2006, *Perceptual Experience,* 49-125. Oxford, UK: Oxford University Press.

Chirimuuta, M. 2008. Reflectance realism and colour constancy: What would count as scientific evidence for Hilbert's ontology of colour? *Australasian Journal of Philosophy 86*(4): 563-582.

Cohen, J. 2007. A relationalist's guide to error about colour perception. *Noûs 41*(2): 335-353.

-- 2008. Colour constancy as counterfactual. *Australasian Journal of Philosophy, 86,* 61-92.

-- 2009. *The Red and the Real: An Essay on Colour Ontology.* Oxford University Press: Oxford, UK.

Conway, B. 2009. Colour vision, cones, and colour-coding in the cortex. *Neuroscientist 15*(3): 274-290.

Fish, W. 2009. *Perception, Hallucination, and Illusion.* Oxford: Oxford University Press.

Hardin 1988. *Colour for Philosophers, expanded edition.* Hackett: Indianapolis, ID.

-- 1992. The Virtues of Illusion. *Philosophical Studies,* 68(3): 371-82.

Hilbert, D. 1992. What is Colour Vision? *Philosophical Studies,* 68(3): 351-70.

Johnston, M. 1992. How to speak of the colours. *Philosophical Studies 68*(3): 221-264.

Kingdom, F. 2008. Perceiving light versus material. *Vision Research 48*: 2090–2105.

Kalderon, Mark Eli. 2011. Colour Illusion. *Noûs, 45*: 751-75.

Lewis, D. (997. Naming the colours. *Australasian Journal of Philosophy 75*: 325-342.

Macpherson 2015. The structure of experience, the nature of the visual, and type 2 blindsight. *Consciousness and Cognition* 32: 104-128.

McGilvray, J. 1994. Constant colours in the head. *Synthese 100*(2): 197-239.

McGinn, C. 1983. *The Subjective View: Secondary Qualities and Indexical Thoughts.* Oxford: Oxford University Press.

Mollon, J. 1989. "tho' she kneel'd in that place where they grew....": The uses and origins of primate colour vision. *Journal of Experimental Biology 146*: 21-38.

Pautz, A. 2006. Can the physicalist explain colour structure in terms of colour experience? *Australasian Journal of Philosophy,* 84(4): 535-564.

Russell, B. 1912. *Problems of Philosophy.*

Shevell, S. 2012. The verriest lecture: Colour lessons from space, time and motion. *Journal of the optical society of America A 29*(2): A337-A345.

Thompson, E. 1995. *Colour Vision*. London: Routledge.

Zeki, S. 1978. Functional specialisation in the visual cortex of the rhesus monkey. *Nature 274*: 423-428.