



Colour variation without objective colour

Derek H. Brown^a (Derek.Brown.2@glasgow.ac.uk)

Abstract

Colour variation is the fact that what colour physical objects look to have depends on viewing conditions and a perceiver's visual system. Both Colour Relationalists and Colour Eliminativists regard their analyses of colour variation as central to the justification for their respective views. Yet the analyses are decidedly different. Colour Relationalists assert that most instances of colour variation are veridical and infer from this that colours are relational properties of objects that are partly determined by perceivers. By contrast, Colour Eliminativists assert that colour variation is too unsystematic to ground the claim that many or most instances of colour variation are veridical. From this they infer that objects don't have colours. I argue that the Eliminativist analysis is superior. On my view, the Relationalist account of veridical colour experience reduces to the assertion that objects have colour simply because they cause perceivers to have colour experiences of them. In this context, I argue, the resulting conception of veridicality is vacuous. More directly, the foundational idea of Eliminativism is the opposite claim: the fact that objects cause perceivers to have colour experiences of them is on its own not sufficient to justify or ground the claim that objects have colour. The Relationalist, I argue, has failed to justify anything stronger than this. In this debate we should thus side with the Eliminativist: objects do not possess colour; they merely cause us to undergo colour experiences.

Keywords

Colour eliminativism · Colour relationalism · Colour variation · Illusion · Metaphysics of colour · Veridicality in perception

1 Introduction

Colour variation is the fact that the colour one perceptually experiences some object¹ to have is affected not only by that object, but also by environmental conditions (e.g. illumination conditions) and aspects of perceivers (e.g. types of cone

^aPhilosophy Department, Centre for the Study of Perceptual Experience, University of Glasgow.

¹I propose two simplifying qualifications. First, unless otherwise specified, by "objects" I mean physical, perceptible objects in the environments surrounding perceivers in our world (e.g. blueberries, cars, trees). Second, objects don't have different colours on different parts, but each is instead uniformly coloured. While there is an obvious practical tension between these claims, as many objects in our environment in fact have multiple colours, there is no logical one. Since these assumptions permit me to sidestep numerous technicalities that would take me off course, I will hold them in place.



cells in their eyes). Thus, the colour a blueberry looks to have can vary under different illuminations and across perceivers with different colour visual systems. Colour variation, and perceptual variation more generally, have always been and remain core phenomena in perceptual theory.² Most often, colour variation is used to argue against *Objective Colour Realism*, the thesis that colours are objective or mind-independent properties possessed by objects.³ The familiar reasoning begins with the existence of colour variation. It proceeds by arguing that there is no principled reason to treat one experienced colour of an object as most accurate (*No Privilege*), and thus that we should treat numerous colour variants as equally accurate (*Ecumenicism*). The conclusion is that the best explanation of these facts requires asserting that colours are not objective.⁴

In this paper, I am not interested in this debate. Persistent focus on the tenability of Objective Colour Realism, while important, masks part of the significance of colour variation. To bring this into focus, I presume that the argument from colour variation against Objective Colour Realism is successful and thus the view is (for at least this reason) false. I examine colour variation as it applies to two central remaining colour ontologies.

My question is whether colour variation gives us reason to accept that colours are in some sense “out there” while nonetheless being perceiver-dependent (*Colour Relationalism*), or to slide to the seemingly more extreme view that eliminates colours from our extra-perceiver world (*Colour Eliminativism*)? Is colour variation better explained by the postulate that blueberries are blue in part because they look blue to perceivers, or by the postulate that blueberries are not blue in any basic sense despite causing us to have experiences of blue?

At first glance, perhaps the question is straightforward. Common sense holds:

The Common Sense Conception of Colour (or simply *Common Sense Colour*): We routinely talk, think and behave as though colours are objective or perceiver-independent features of objects around us.

²Contemporary research on colour variation demonstrates that the phenomenon is widespread. Notably, numerous forms of colour variation are found among “normal” perceptions. For example, these might be due to normal variations in lighting, surrounding objects, angle of viewing, or other aspects of perceptual conditions. They could also be due to normal variations in cone absorption curves, adaptation, or other aspects of perceptual apparatuses. It is very difficult to categorize these instances of colour variation as erroneous. In addition, there are powerful arguments to resist categorizing several instances of colour variation found outside “normal” perceptions as erroneous. These include perceptual variations due to some forms of colour blindness, artificial lighting, and so on. See e.g. Cohen (2009, ch. 2) for an overview.

³Two important versions of Objective Colour Realism are reflectance physicalism (e.g. Bradley & Tye, 2001; Byrne & Hilbert, 2003, 2021), and colour primitivism (e.g. Allen, 2016; Campbell, 1993; Gert, 2017; Watkins, 2005).

⁴Russell famously employs this reasoning in the opening pages of *Problems of Philosophy*. Cohen (2009, ch. 2) contains a recent, clear presentation, although his aim is not merely to reject objective colour but instead to defend colour relationalism. The latter inference is the subject of this work. Kalderon (2007) is an important critique of this kind of reasoning.

Evidence for *Common Sense Colour* includes our social and linguistic commitment to, for example, blueberries being blue (full stop). Evidence also includes our experiencing colour as inhering in object surfaces, as going where the object goes and as remaining stable so long as the object is. And so on. While there is reason to question *Common Sense Colour*, for dialectical purposes I presume that something in the vicinity is embedded in our colour thought, speech and behaviour.⁵

Eliminativism asserts that objects aren't coloured and is thus straightforwardly at odds with *Common Sense Colour*. A natural worry is that any attempt the Eliminativist might make to explain *Common Sense Colour* will be quite *revisionary*, and thus that Eliminativism should be regarded as a view of last resort, countenanced only once all alternatives have been overwhelmingly rejected. We find this argument not only in Relationalist works (Cohen, 2009, pp. 64–74) but also in Eliminativist ones (Boghossian & Velleman, 1989). In the present context, the result is not merely an immediate victory for Relationalism but a victory with significant resilience. So long as Relationalism remains coherent and broadly consistent with empirical data it will always be preferable to the staunchly revisionist Eliminativism. As tempting as this reasoning is, it is mistaken.

Crucially, the currently dominant form of Relationalism, which I will call *Ecumenical Relationalism* (see §3), itself provides a revisionary explanation of *Common Sense Colour*.⁶ Thus, Relationalists cannot object to Eliminativism on these grounds without demonstrating that their explanation is “less revisionary” than the Eliminativist one. To date no such argument has been offered, and in my judgement the two views are roughly equally revisionary when it comes to explaining *Common Sense Colour*. In the interest of length I set this topic aside.

My focus is instead on the Eliminativist and Ecumenical Relationalist accounts of *veridical* and *non-veridical* perceptual *experience*, both of which are proposed in large part to explain colour variation. We can and should assess this core aspect of these theories independently of their explanations of *Common Sense Colour*. The two views are diametrically opposed on this dimension: according to Eliminativism, all colour experiences are non-veridical; according to Ecumenical Relationalism, virtually all colour experiences are veridical. This difference, however, rests on a common foundation.

⁵For recent experimental literature on folk colour beliefs see e.g. Adams and Hansen (2020), Cohen and Nichols (2010), Roberts et al. (2014) and Roberts and Schmidtke (2019).

⁶I regard Cohen (2009) and Chirimuuta (2015) as the most important defenses of Ecumenical Relationalism. Cohen (2009, ch. 4) recognizes that he needs to provide a revisionary explanation of *Common Sense Colour* and constructs his “coarse-grained” colours to serve this purpose. Coarse-grained colours are not introduced to explain colour perception or colour experience. They are instead “introduced to account for our thought and talk about color” (Cohen, 2009, p. 113). They are needed precisely because the heart of Ecumenical Relationalism – their relational account of the colours we perceive – cannot adequately explain *Common Sense Colour*. Chirimuuta doesn't provide a developed account of *Common Sense Colour*. I suspect this is because her primary task is to provide an account of colour vision and colour experience. Her theory of the colours we perceive is similar to Cohen's and thus equally unable to explain *Common Sense Colour* on its own.

Both Eliminativists and Ecumenical Relationalists accept colour variation, No Privilege and Ecumenicism as these are described in the opening paragraph. Their difference emerges from what each infers from this foundation. Eliminativists infer that colours are most likely not “out there”, and when our colour experiences routinely suggest otherwise the experiences are thereby erroneous. Objects often cause us to have colour experiences, but not because the objects are coloured. By contrast, Ecumenical Relationalists infer that colours are “out there” in some important sense but also that they are relative to the many factors that impact colour experience. As a result, for Ecumenical Relationalists colour experience is virtually always veridical of the highly-relativized colours in our world.

My question is: Are there grounds to prefer one of these accounts of (non-)veridical perceptual experience – one of these interpretations of colour variation – over the other? Here one might maintain that another argument quickly emerges in favour of Ecumenical Relationalism: by default, we believe that colour experiences are typically veridical; Ecumenical Relationalism preserves this; Eliminativism does not; hence the former is preferable. I will resist this argument.

First, there is plenty of value and purpose to colour experience and colour vision more broadly even if those states are non-veridical (see §§2,6,7). There is thus no theoretical requirement that colour experiences be veridical, and any theory that proposes that they are should be assessed in terms of its explanatory power against rival options.

Second, it follows that if we are to endorse an account of veridical and non-veridical colour experience, in this case the Ecumenical Relationalist account, the account must be explanatorily satisfying and more powerful than the opposing Eliminativist account. I maintain that this is not achieved in this case. Within Ecumenical Relationalism perceptual illusion is impossible (§5) – this component of their account of non-veridical experience fails. The other component pertains to hallucinations and related phenomena. These, I argue, cannot justify the Ecumenical Relationalist conception of veridical experience in a debate with the Eliminativist (§6). This leaves me to directly compare the Ecumenical Relationalist conception of veridical experience with the Eliminativist analysis of the relevant cases (§7). I argue that the former reduces to the assertion that colour experiences are veridical simply because they cause perceivers to have colour experiences of them. This is, pretheoretically, an exceedingly weak conception of veridicality. More directly, the foundational idea of Eliminativism is the opposite claim: given the robustness of colour variation, the fact that objects cause perceivers to have colour experiences of them is on its own not sufficient to justify or ground the claim that colour experiences are veridical. Eliminativists are, I argue, on safe territory here. If we are to reject Eliminativism in favour of Ecumenical Relationalism, it must be because we can demonstrate that there is more to objects regarding colour than a power to cause perceivers to have colour experiences of them.



The Ecumenical Relationalist has failed to do this. Their account of veridical colour experience has all the advantages of theft over honest toil (Russell, 2020, p. 71). We should thus side with the Eliminativist over the Ecumenical Relationalist: objects don't possess colour; they merely cause us to undergo colour experiences. I proceed with brief primers on Eliminativism (§2) and Ecumenical Relationalism (§3). Readers familiar with these topics can skip to §4.

2 Colour Eliminativism primer

Colour Eliminativists⁷ maintain that there are no basic colours in our extra-perceiver world. For our purposes, *basic colours* are properties that intrinsically have features such as hues, saturations and lightnesses.⁸ Eliminativists are driven to this conclusion via key colour perceptual phenomena like colour variation and colour structure⁹. Regarding colour variation and the reasoning rehearsed at the outset, the contention is that the collection of colour experiences of a given object that we are forced to regard as equally veridical is too varied and unprincipled to support the claim that any of them are veridical. Thus, objects don't have colour. Before proceeding with that discussion, it is worth briefly unpacking the view.

It is fair to say that Eliminativists value adequate explanations of phenomena like colour variation more than, for example, offering a straightforward account of *Common Sense Colour*. In this regard, theirs is a “perception first” approach to colour (as opposed, e.g., to a “language first” or “no priority” approach). They need not (and generally do not) doubt that there are blueberries, that blueberries often cause perceivers to undergo colour experiences, or that our concept BLUE is often meaningfully applied, and to good effect, to blueberries. What they doubt is that blueberries are blue in a basic sense, believing instead that blueberries merely have the power to cause perceivers to undergo colour experiences. Insofar as we can explain what basic colours are, blueberries *only* have this causal role. No feature of blueberries is part of the basic nature of colour or of what constitutes basic colour.

⁷See, e.g. Averill (2005), Boghossian and Velleman (1989), Hardin (1988), Maund (1995, 2006), plus additional works cited in this section.

⁸The rough idea is that colours have features such as hues, saturations and lightnesses in themselves, as opposed to by virtue of their connection to something outside colour, and because of this these features are central to the nature of colour. By contrast, one might for example hold that hues and the like are not features of colours themselves but arise from experiences of colours, and infer from this that these features are not part of the nature of colour. In my experience the relevant notion of ‘intrinsicness’ is typically left at an intuitive level, though it would be interesting to see if anything interesting arises from applying more specific concepts (e.g. focusing on ‘local’, ‘interior’, or ‘duplication-preserving’ senses of ‘intrinsicness’, or something more specific still; see Marshall & Weatherson 2018 for an overview of ‘intrinsicness’).

⁹On the argument from the structure of colour see e.g. Hardin (1988) and Pautz (2006). See Briggs (2021) for a recent overview of colour spaces, noting that what Briggs calls the “perceptual models” of human trichromatic colour are most directly relevant to the Eliminativist argument from structure.

Within these constraints one can develop Eliminativism along several dimensions. While these dimensions overlap in interesting ways, it is valuable to identify each on its own. One dimension concerns the account of basic colour. Several options are available here, including: colours are properties of sense-data (Russell, 1912); colours are properties of internal mental states (McGilvray, 1994); colours are merely illusory (Maund, 1995); colours are only found on Eden (Chalmers, 2006); colours are Platonic universals (Pautz, 2007); and so on. Another dimension concerns how Eliminativists account for *Common Sense Colour*. Two important strategies are dual-colour accounts Brown (2006) and fictionalism (e.g. Gatzia, 2010). A third dimension concerns the account of colour experience, and in particular the account of experiential error. Here one might opt for a classic sense-datum model (e.g. Russell, 1912), a more contemporary representationalist one (e.g. Chalmers, 2006), et cetera. These dimensions, while important, are not directly relevant to my discussion.

Of more relevance to my discussion is how the Eliminativist mitigates the charge that arises from the Eliminativist commitment to widespread error in colour experience. Recall, Eliminativists are error-theorists about a central component of colour experience: when, in experience, colours are ascribed to objects (as they often are), there is experiential error. The charge is that this commitment seems problematic, a worry that can be expressed via several ideas. Shouldn't we avoid this outcome if possible? Why would colour experience be the way it is if it was so often erroneous? Is the Eliminativist committed, for example, to colour experience being an evolutionary spandrel (i.e. something that was selected for, not because of its adaptive value, but by luck)? The broad Eliminativist response has two parts.

First, the Eliminativist maintains that their account of colour experience is the best explanation of phenomena like colour variation. One way to illustrate this is to compare the Eliminativist explanation with that of a rival who, in agreement with the Eliminativist, accepts No Privilege and Ecumenicism. This of course is a central aim of what follows.

Second, it is important to the Eliminativist that their view is compatible with colour experience, and colour vision more widely, having considerable adaptive, epistemic, social and practical value.¹⁰ Colour experience often helps to correctly represent the shapes, locations and sizes of objects, and the ripeness of fruit. Colour experience can be used to quickly identify and track objects and identify their material nature. Colour perceptual processing assists spatial processing and, in this regard, helps us to see shapes and objects. Colour vision categorizes disparate incoming wavelength information into cognitively manageable "chunks" (e.g. the blues, the greens). And, of course, colour experience makes a

¹⁰Worthwhile discussions of the value and purpose of colour include Hardin (1992), Matthen (1999), Maund (2006), Akins & Hahn (2014) and Chirimuuta (2015, esp. ch. 4). Not all of these theorists advocate Eliminativism, but it is straightforward that many if not all of the values or purposes of colour that they discuss are consistent with Eliminativism. By contrast, Hilbert (1992) offers an account of the purpose of colour vision that directly supports objective colour realism.

substantive contribution to our aesthetic lives. In short, there remain numerous values and purposes of colour experience and colour vision more generally, even if Eliminativism is true. Since these values and purposes arguably do not directly depend on the correct analysis of the nature of colour let us call them:

Theoretically neutral values of colour experience: this includes various adaptive, epistemic, social and practical uses of colour experience regardless of one's colour theory.

Thus, according to the Eliminativist, there are many reasons for why colour experience and colour vision are valuable, even though colour experience and colour vision don't detect basic colours in the environment. Indeed, the Eliminativist can push harder and turn this defensive point into an offensive argument. The thought is that there is no need to resist an error-laden account of colour experience, given how valuable colour experience is independently of one's views about experiential error, colour ontology, and so on. What is gained from insisting that colours are "out there", or that colour experience is typically veridical? As you will see (§§6&7), this issue manifests itself in a fascinating way in the debate between Eliminativists and Ecumenical Relationalists. I proceed with a brief primer of the latter.

3 Colour Relationalism primer

Colour relationalists maintain that colours are relations between perceivers, perceived objects in their environments, and the environmental conditions facilitating these perceptions. The rough thought is that indexing colours to these kinds of parameters creates space to provide a compelling analysis of colour variation. As with Colour Eliminativism, there are many variants of Relationalism.¹¹ On a standard approach objects in our environment have colours, but colours are perceiver-dependent. Blueberries are blue, but blue is a property that depends in part on perceptual experiences of blue.

As mentioned in §1, it is now common for Relationalists to treat most if not all instances of colour variation as veridical. Thus, the class of veridical colour experiences is quite wide, including variable colour experiences due to colour blindness, strange lighting, contrast effects, those associated with unique hue perceptions, and so on. To capture this colours are defined by the highly specific relations that are sensitive to all the parameters in perceptual systems and perceptual conditions that impact veridical colour experience. Thus, a given colour will be defined as a relation that includes "detailed information about the perceiver's visual system

¹¹I have discussed variations on relationalism elsewhere (see Brown, 2015, 2017). Here are some options. (1) There can be more and less reductive accounts of colour relationalism. (2) *Dispositionists* (Cohen, 2009) typically hold that objects maintain their colours when not perceived, and *interactionists* (Chirimuuta, 2015) deny this. (3) Colours might belong to objects like blueberries that have the power to induce colour perceptual states in perceivers (most relationalists accept this), or to the perceptual interactions that occur during colour perceptions (Chirimuuta, 2015). These important differences are tangential to my argument.

and visual circumstance, including state of adaptation, viewing distance and angle, ambient illuminant, simultaneously seen objects, and so on” (Cohen, 2009, p. 101). Since this approach, which I call *Ecumenical Relationalism*, is now the dominant form of Colour Relationalism, it is my focus.¹² Let me briefly flesh it out.

A natural question to ask is: Are there any non-veridical colour experiences within Ecumenical Relationalism? There are a few, and this fact provides one important point for comparison with Eliminativism. I discuss these in §§5–7. For now, simply note that the view does recognize a select few non-veridical colour experiences.

Since a very wide range of colour variations are veridical, a given object can correctly enter into as many different colour relations – and thus “have” as many colours – as are needed to recover this. How many colours does a given object have? While there is room to debate the matter, Cohen has committed himself to:

Universal Colour Pluralism: each perceptible object in one’s environment has every colour.¹³

From these tenets we can isolate a schematic principle for Ecumenical Relationalism.

It is common for Relationalists to define colours by schemas that reflect the kind of dependency of colour on objects and perceptual experience that the view defends. A classic formulation is:

(A) object o_1 is colour c_1 iff in normal conditions o_1 causes normal perceivers to perceptually experience o_1 as c_1 .

Since Ecumenical Relationalism does not define veridicality in terms of anything akin to normal perceptions or conditions, but instead includes a much wider class of cases, Cohen proposes the term ‘appropriate’ with the intention that this is to be understood to include the kinds of colour variations mentioned in §1 (note 2). Non-veridical colour experiences are deemed ‘inappropriate’. This yields:

¹²It is of course open to different relationalists to draw the lines between veridical and non-veridical colour experiences differently. I take my lead from two leading manuscripts defending this form of relationalism – Cohen (2009) and Chirimuuta (2015) – who agree with the characterization in the text. I will contrast their views where appropriate. One important contrast that falls outside our scope is that, whereas Cohen is a representationalist about perception Chirimuuta is a kind of naïve realist/relationalist, albeit one who accepts the existence of some colour illusions and hallucinations. For simplicity, I will speak of ‘veridical’ and ‘non-veridical’ colour states instead of ‘good’ and ‘bad’ ones, noting that the latter terminology is preferred by naïve realists. Nothing of substance in what follows hinges on this. Another important difference is that Cohen is a dispositionalist (ascribing colours to objects like berries), and Chirimuuta is an interactionist (ascribing colours to colour interactions between perceivers and objects). Thus, for Chirimuuta objects don’t “have” colours, they “enter into” the colour interactions that are colours. This difference does not affect the substance of what follows. For simplicity, I presume dispositionalism in the text and save remarks about interactionist relationalism for footnotes.

¹³In Cohen’s words, “ordinary objects have infinitely many colours” (Cohen, 2004, p. 472; see also 2009, p. 133). Chirimuuta (2015) doesn’t explicitly address this issue, but her view plausibly entails Universal Colour Pluralism.

(B) object o_1 is colour c_1 iff in appropriate conditions o_1 causes appropriate perceivers to perceptually experience o_1 as c_1 .¹⁴

While (B) appears straightforward, it is not.

First, the left-to-right conditional is problematic. According to (B), if object o_1 is blue, then in appropriate conditions o_1 causes appropriate perceivers to perceptually experience o_1 as blue. But this is only true in a small subset of cases, and false as a general statement. An improved left-to-right conditional is: if object o_1 is blue, then *there is a set (of one or more) appropriate conditions in which o_1 causes the members of some set (of one or more) of appropriate perceivers to perceptually experience o_1 as blue.* The right-to-left conditional is not inherently problematic but nonetheless could mislead. The conditional is: if in appropriate conditions o_1 causes appropriate perceivers to perceptually experience o_1 as blue, then o_1 is blue. This could mislead if it were taken to imply that most appropriate perceivers in most appropriate conditions will experience o_1 as blue, which is generally false within Ecumenical Relationalism. To avoid confusion it is thus beneficial to make the relevant scope explicit: if *there is a set (of one or more) appropriate conditions in which o_1 causes the members of some set (of one or more) of appropriate perceivers to perceptually experience o_1 as blue,* then o_1 is blue. I therefore suggest that Ecumenical Relationalism is better represented by:

(B*) object o_1 is colour c_1 iff there is a set (of one or more) appropriate conditions in which o_1 causes the members of some set (of one or more) of appropriate perceivers to perceptually experience o_1 as c_1 .

This is more cleanly consistent with the wide range of veridicality conditions at the heart of Ecumenical Relationalism, and with Universal Colour Pluralism. I examine its implications below.

With the main tenets of Ecumenical Relationalism in hand¹⁵, I proceed with my argument in favour of Eliminativism over Relationalism.

¹⁴Cohen's specific proposal is "object x is blue iff in appropriate conditions x causes perceivers to experience blue" (Cohen, 2009, p. 182). I presume (B) is a suitable generalization. I leave the reader to formulate a suitable interactionalist principle in accordance with Chirimuuta's approach.

¹⁵There are various critiques of Relationalism that I will not consider. One criticism asserts that we don't experience colours as relations of the sort posited by relationalism ("colours don't look like relations") but instead experienced colours as non-relational properties of objects. If this objection holds, Relationalism becomes an error-theory about an aspect of colour experience. Some Relationalists have responded that colours *do* look like dispositions or at least don't look to be non-dispositional Chirimuuta (2015). A related charge asserts that colours are non-relational not only in colour experience, but also as represented in *Common Sense Colour*. If accurate, this would impact Relationalism's ability to explain *Common Sense Colour*. For recent discussion see again e.g. Adams and Hansen (2020), Cohen and Nichols (2010), Roberts et al. (2014) and Roberts and Schmidtke (2019). A third objection stems from circularity, which roughly charges that Relationalism defines blue by reference to experiencing/looking blue, and vice versa, and that this is a vicious form of circularity. If successful, the circularity objection renders Relationalism incoherent. For important discussions see Peacocke (1984), Levin (2000), and more recently Maund (2012). While the Eliminativist may push these kinds of criticisms in defending their view against Relationalism, my focus is instead on the Ecumenical Relationalist conception of (non-)veridicality.

4 Contextualizing veridical and non-veridical colour experience

For Ecumenical Colour Relationalists, colours are mind-dependent properties of objects that we often correctly perceive in visual experience.¹⁶ I suspect that for many readers these are attractive features of the view. However, readers may also worry that it seems too easy to achieve veridical colour experiences within Ecumenical Relationalism. The combination of (B*), which is rather under-constrained, and Universal Colour Pluralism, collectively seem to imply that perceptual error is hard to come by. This is a challenge that Ecumenical Relationalists are aware of (see below for references). My aim in the rest of this work is partly to argue that this worry is not misplaced: the Ecumenical Relationalist conception of veridical and non-veridical colour experience is deeply problematic. The broader, more important, aim is to argue for a positive conclusion, namely that the Eliminativist view is explanatorily superior and indeed compelling. My strategy is as follows. In §5 I argue against the Ecumenical Relationalist conception of colour illusion. In §6 I consider the remaining kinds of non-veridical colour experience endorsed by Ecumenical Relationalists and argue that these are not sufficient to justify their distinction between veridical and non-veridical colour experience. This is particularly apparent when compared with the Eliminativist analysis. In §7 I compare the overall Eliminativist analysis with that of the Ecumenical Relationalist, arguing that no substance remains of the latter's conception of veridical colour experience. The Eliminativist analysis of colour variation is therefore superior to the Ecumenical Relationalist analysis. Before delving into these details, we need some shared terminology around veridicality and non-veridicality in perception.

There is no agreed theoretical system for veridicality and non-veridicality in perception, so I will make some assumptions that are broadly in accordance with an established practice. Perceptual states *represent* the world before the subject to be some way or other (e.g. *P*'s perceptual state might represent that o_1 is before *P* and that o_1 is *F*).¹⁷ This is to say that perceptual states express *contents* about the perceptually available world and thus are to some degree accurate or true of that world (or fail to be such). Despite our best efforts, there is nothing akin to an agreed account of perceptual representation. However, it is fruitful to think about perceptual representation in terms of the objects and properties a given representation purportedly *detects* or *measures* in the surrounding environment. I follow common practice and understand perceptual *experiences* as representational.¹⁸

¹⁶Or, for the interactionist, properties of the mind-environment interactions that are colour perceptions.

¹⁷Might perceptual states represent things outside our world? Yes. For example, perhaps one hallucinates a fictional creature such as a unicorn or Harry Potter. These fascinating cases fall outside the purview of this discussion.

¹⁸There is a very large literature on the relation between perceptual experience and perceptual content. I presume the relation is tight enough to do the explanatory work needed here. This

What is it for a perceptual experience to be *veridical*? It is generally agreed that for a given perceptual experience to be veridical it must, at minimum, “match” what it represents (the *Matching condition*), and must be “appropriately caused” by what it represents (the *Causal condition*). If an experience represents that o_1 is F , then for it to be veridical it must, at minimum, be suitably caused by o_1 and o_1 must in fact be F . To take a rough example, for an experience as of a sphere to be veridical it must at least be of a sphere (in which case the experience matches the target object), and must arise from looking at that sphere (in which case that sphere is appropriately causing the experience by virtue of the sphere reflecting light into one’s eyes). Violating one or more of these conditions thus entails the experience is *non-veridical*.

Given that Ecumenical Relationalists maintain that all experiences of colour variation should be regarded as veridical, what candidates for non-veridical colour experience do they propose? They propose: hallucinations, dreams, afterimages, phosphenes, some colour experiences arising from deviant causal chains, and “low-contrast scenarios”.¹⁹ With the exception of “low-contrast scenarios” (see §5.4), the justification offered for these types of colour experiences being non-veridical is that they are “naturally and pre-theoretically described as erroneous” (Cohen, 2007, p. 349).²⁰ Thus, it is claimed, the fact that Ecumenical Relationalism can incorporate this ruling into its account is a virtue.

To aid discussion I split the proposed kinds of non-veridical colour experience into two categories:

Colour illusions: This includes proposed deviant causal chain cases and “low-contrast” scenarios.

“Disconnected” colour experiences: This includes hallucinations, dreams, afterimages and phosphenes.

Let me briefly remark on this division. Intuitively, a *colour illusion* involves experiencing something to be a colour that it isn’t, for example when one is looking at something green but experiences it as blue.²¹ As will be plain, the proposed de-

does not entail that experiences strongly supervene on contents or are identical with contents, though it is consistent with such theses.

¹⁹Cohen (2007) emphasizes hallucinations, afterimages, and the relevant deviant causal chain case. Chirimuuta emphasizes hallucinations, dreams, phosphenes (2015, pp. 155–156) and “low-contrast scenarios” (2015, p. 181). Cohen also recognizes illusions due to error in cognitive (i.e. post-perceptual) judgement. In these cases a perceiver judges her colour experience to be other than it is (e.g. she is primed to expect to experience something green, she instead experiences something as blue, but the prime prompts her to judge that she is actually experiencing the thing as green). Since these are not errors of perception, and can be wholly endorsed by Eliminativists, I set them aside.

²⁰Chirimuuta doesn’t offer an explicit justification for categorizing hallucinations, dreams and phosphenes as erroneous colour experiences. However, the tone of her discussion suggests that, like Cohen, to her the designation is natural or intuitive.

²¹A more technical definition of *illusion* is: an experience that is being actively caused by, and is about, an instance of a property, and in which the property one experiences (or is having

viant causal chain cases and “low-contrast” scenarios are intended to be illusions in this rough sense. Colour illusions, and illusions more generally, involve an experience that, though erroneous, is nonetheless actively engaging the entity it is a misperception of. In this sense illusions intuitively involve experiences that are “connected” to their intentional object, much like veridical experiences (though, obviously, with veridical experiences the “connection” is wholly a good one). For this reason, when I have cause to discuss the union of illusory and veridical experiences in §§6&7 I will refer to them as *Connected* experiences.

By contrast *Disconnected* experiences lack an active or real-time engagement with the relevant perceptual property or object. Each case listed satisfies this. Dreams occur when one’s eyes are closed, and one isn’t “seeing”. Phosphenes occur when one depresses the side of one’s eye and experiences a “coloured blotch” bearing no connection to what is before one (unless by luck). Afterimages are colour experiences that are caused by a previously seen stimulus when that stimulus is no longer present. Although they are caused by and somewhat resemble past perceptions of objects, afterimages don’t “track” those objects. Instead, afterimages maintain a specific location in your visual field (e.g. above your focal point), regardless of what the worldly object does or where your gaze shifts to. Hallucinations are often characterized as perceptual experiences that are internally generated and are typically of things that are in fact not there in one’s environment. For example, if you hear a voice and no one is speaking nearby you would be undergoing a hallucination. More precisely, following Macpherson and Batty (2016), hallucinations are perceptual states that are not causally connected to their objects in any straightforward, counterfactually supporting way. Thus, although LSD can cause hallucinations, the LSD isn’t the object of the induced hallucinations and isn’t causally connected to the hallucinations in a counterfactually supporting way. Where a hallucination induced by LSD happens to be a hallucination of LSD, the match is by chance and is what is often called a veridical hallucination.^{22,23}

Is the Ecumenical Relationalist account of non-veridical experience robust and justified, and is it superior to the Eliminativist claim that all colour experience is non-veridical? It is not. To see this I first assess the Ecumenical Relationalist account of colour illusion.

an experience “as of”) doesn’t match the property in question. This characterization is roughly in line with Macpherson and Batty (2016), although their conception of illusion also applies to experiences of objects. This innovation is not relevant to my aims.

²²This is widely classified as a deviant causal chain case involving a hallucination and not an illusion. As we will see in the next section, these are *not* the kind of deviant causal chain case Ecumenical Relationalists put forward as illusory. I thus regard veridical hallucinations as hallucinations, and in turn as *Disconnected* experiences (see below for details).

²³Two additional points. The types of *Disconnected* cases needn’t be mutually exclusive. E.g. depending on one’s account of hallucination each of dreams, phosphenes and afterimages may or may not count as hallucinations. The *Disconnected* terminology is neutral on these debates. Finally, another important class of *Disconnected* experiences – not discussed by Ecumenical Relationalists – is colour imaginings.

5 Colour illusion within Ecumenical Relationalism

Recall that the Ecumenical Relationalist account of colour illusion includes two kinds of cases: deviant causal chains and Chirimuuta's "low-contrast scenarios".²⁴ I argue that this account fails because their combined commitment to *Universal Colour Pluralism* and to a vast class of veridical colour experiences (i.e. far beyond what's included in normal conditions and perceivers) leaves no space to justify attributing error in the cases at issue or in *Connected* colour experiences more generally. Within Ecumenical Relationalism, as soon as a colour experience is *Connected*, it is veridical. My assessment proceeds by examining: Cohen's argument from naturalness (§5.1); deviant causal chains (§5.2); synaesthesia (§5.3); and low-contrast scenarios (§5.4). I conclude that the Ecumenical Relationalist has not offered a viable account of colour illusion and that one is not likely forthcoming.²⁵

5.1 Argument from naturalness

As mentioned, Ecumenical Relationalists justify their account of colour illusion (and non-veridicality more widely) by appeal to "naturalness" and "pretheoretic" appeal (Cohen, 2007, p. 349; see also 2012, pp. 369–370). Regardless of the naturalness of designating their proposed cases as illusory, this justification is misleading because Ecumenical Relationalism categorizes as *veridical* many colour experiences that are "naturally" and "pretheoretically" deemed non-veridical. This includes experiences involving persons with colour blindness and experiences in "funny" viewing conditions (e.g. with colour lights). It also includes experiences of many stock examples of illusions in psychological literature, for example many puzzling instances of contrast effects (e.g. the Adelson Illusion, Kitaoka's many examples), the Watercolour Illusions, Neon Colour Spreading Illusions, the McCollough Effect, and so on.²⁶ On standard accounts, these kinds of illusions are of interest to psychologists because they reveal nuances of colour visual systems by exploiting their rules and effectively "tricking" the systems. Thus, these cases are not only intuitively erroneous, they are erroneous for well-motivated theoretical reasons. Yet Ecumenical Relationalists regard them all as veridical. They cannot, therefore, justify their account of illusion on grounds of its "naturalness"

²⁴As mentioned above (fn. 25), a third class of cases involve error due to cognitive (i.e. post-perceptual) judgement. As before, I see these aside as they are tangential to this discussion.

²⁵Note that Gatzia (2010) also argues that Ecumenical Relationalists are precluded from accommodating colour illusions. She argues that Ecumenical Relationalists can only accommodate error via hallucination and via cognitions about perceptual experiences (e.g. errors in beliefs about experiences). I agree with her conclusion. However, I regard it as imperative to reach the conclusion by analyzing the argument from naturalness and the following cases, none of which are discussed in Gatzia's otherwise valuable piece.

²⁶Readers are encouraged to consult sources such as *The Illusions Index* to experience the effects: <https://www.illusionsindex.org/>.

by cherry-picking for inclusion a few “natural” cases and excluding a host of others. The legitimacy of their account of colour illusion therefore falls squarely on its internal merit. Here are the key cases.

5.2 Deviant causal chains

Cohen’s account of colour illusion rests on his contention that colour experiences involving deviant causal chains should be deemed illusory. Since perceptual experiences arising via deviant chains are generally regarded as non-veridical, he is appealing to an antecedently plausible case. His example is of a telekinetic tomato, where the tomato intervenes in any attempt to look at it and telekinetically induces a colour experience that is “opposite” from what the photon-based causal chain would have induced. For example, if one is about to gaze at the unripe tomato and experience it as green, the tomato telekinetically produces an experience of red. Thus, the induced colour experience is due to an odd causal chain and is a mismatch for what would otherwise be experienced via a more “standard” visual process. Since such a case is typically assessed as involving colour error, Cohen argues that Ecumenical Relationalism can take this assessment on board. I disagree.

Recall from §4 that for a given perceptual experience to be veridical it must, at minimum, “match” what it represents (the *Matching condition*), and must be “appropriately caused” by what it represents (the *Causal condition*). If an experience represents that o_1 is F , then for it to be veridical it must, at minimum, be caused by o_1 and o_1 must in fact be F . Discussions of deviant causal chains typically presume the Causal and Matching conditions as minimal conditions on veridicality and proceed by examining cases that purport to violate one or both of these conditions.²⁷ Unfortunately, these discussions are notoriously tricky, with numerous odd cases and variants on those cases, applied to different theoretical proposals. I do not aim to provide a thorough analysis. Instead, I will first make a general case for why Ecumenical Relationalists cannot import “pretheoretic” intuitions about deviant causal chain cases in support of their account of colour illusion, and then explain this in detail via Cohen’s telekinetic tomato case. Here is the general worry.

Universal Colour Pluralism – the thesis that every object has every colour – guarantees that the Matching condition is satisfied for any colour experience of an object. This places considerable weight on the Causal condition (or additional conditions) to justify the claim that a given experience is non-veridical. One way to see the broad effect of this is by recalling that a common way of characterizing deviant perceptual cases is as perceptual experiences that match their object but do so by *luck* or *accident*. Often this implies that the experience could have just as easily failed to match because the match was lucky, or that, if the object were to change in relevant ways the experience would not match because the match was lucky. The difficulty is that, given Universal Colour Pluralism, the matching condition will always be satisfied and thus it is hard to generate a substantial notion

²⁷Arstila and Pihlainen (2009) is a good review of the literature on deviant causal chains. Additional references are given below in both the main text and in footnotes.



of *luck*. There is an additional concern. When trying to sort causal chains into deviant and non-deviant ones, a plausible starting place is the intuitive division between normal and abnormal perceptual conditions and perceivers, respectively. For example, one can mine cases involving normal conditions for instances of non-deviant causal chains, and mine cases involving abnormal conditions for instances of deviant chains. This strategy is unavailable to the Ecumenical Relationalism. Since it is central to the view that there are many abnormal perceptual conditions and perceivers that yield veridical colour experiences, Ecumenical Relationalists must start in a different spot. The same, I submit, is likely true of various intuitive starting places for uncovering or examining cases of error due to deviant causal chains. Put another way, our intuitions about when a causal chain is deviant (and thus generating perceptual error) cannot be imported into Ecumenical Relationalism in any straightforward manner. Let me illustrate this via Cohen's example.

The telekinetic tomato intervenes in any attempt to look at it and telekinetically induces a colour experience that is "opposite" from what the photon-based causal chain would have induced. For example, if the unripe tomato would have been experienced as green when looked at with one's eyes, the tomato telekinetically induces an experience of red instead of green. Let me use classic relationalism (recall (A) from §3) to illustrate a standard analysis of the case. According to classic relationalism, if a normal perceiver were to look at the tomato in normal conditions and experience it as green, then the tomato is green. Given this, if the tomato telekinetically intervenes and induces an experience of red in a perceiver who looks at it, then the colour experience is erroneous. Why? Because the colour experience doesn't match the tomato's colour. In addition, we now have reason to *distrust* the telekinetic causal chain because in normal conditions for a normal perceiver the telekinetically-induced colour experience is erroneous. Thus, both the Matching and Causal conditions are, all else being equal, not satisfied and the experience is cleanly erroneous.

This simple analysis is unavailable to the Ecumenical Relationalist because their analysis begins with the premise that the tomato has every colour. By hypothesis, if our hypothetical perceiver were to look at the tomato, then the photon-induced experience would be of green and hence the telekinetically-induced experience is of red. Suppose the perceiver looks at the tomato and experiences the telekinetically-induced experience of red. Why is the experience of red erroneous? The Ecumenical Relationalist cannot assert that the experience of red fails to match the tomato's colour, because the tomato has every colour. We therefore also don't yet have evidence to distrust the telekinetic causal chain: all that chain has done is induce an experience that diverges from the experience that would be induced by the photon-based chain, and shifting an experience from one feature an object possesses to another it possesses isn't evidence of deviance. Thus, the simple account of why the case involves error is blocked.

A different analysis might assert that telekinetic causal chains are inherently deviant. However, it is difficult to justify this claim on general grounds. To see why, recall Lewis's (1980) classic discussion of prosthetic vision. Prosthetic vision

is a broad category in which perceptual experiences are induced via processes involving “prosthetics”. A standard example involves inserting a bionic eye into one’s eye socket instead of a biological eye. Lewis’s influential analysis holds that prosthetic vision is on its own no barrier to veridical perception, provided experiences deemed veridical at minimum satisfy reasonable construals of the Matching and Causal conditions. Thus, if the bionic eye were on the back of one’s head or in another part of the universe the resulting experiences could still be veridical, and (to simplify) a given experience would be veridical when it matches and doesn’t do so by luck, and would be non-veridical otherwise. Lewis sees “no real need for any limits on how a prosthetic eye might work. Even the least convincing cases of prosthetic vision are quite convincing enough” (Lewis, 1980, p. 224). I am not sure if Lewis’s permissiveness should be endorsed in general, but let me explain why its application in this context seems apt.

Telekinetic perception seems causally odd to us. However, presumably there are creatures in possible worlds for whom it is natural, reliable, and capable of yielding veridical experiences. In this regard telekinetic perception is not inherently defective. In Cohen’s example it is humans who have telekinetically-induced colour experiences. Why deem these experiences to be non-veridical when the Matching condition is satisfied and the Ecumenical Relationalist is already committed to regarding many abnormally produced colour experiences as veridical? It is hard to give a compelling answer. Consider some options.

- (1) *Consistent experiences.* As described by Cohen, the tomato *consistently* induces, via telekinesis, a colour experience that is opposite to the one that would be induced via photon-based vision. A causal mechanism that consistently produces colour experiences that match a colour of the target object has the hallmarks of veridical perception. In this case the perceiver has access to two visual causal pathways, a photon-retinal pathway and a telekinetic one, where the latter overrides the former when the subject looks at this tomato.
- (2) *Random experiences.* Suppose instead that the tomato induces seemingly *random* colour experiences. Setting aside Ecumenical Relationalism, if an object’s colour changes randomly, then colour experiences of that object that seem random – but are in fact Matching – would be veridical. Within Ecumenical Relationalism, each of these seemingly random experiences do satisfy the Matching condition. There is thus no obvious reason why any is erroneous.
- (3) *Sporadic experiences.* Suppose instead that the tomato only *sporadically* activates the telekinetic causal chain, making the causal pathway only sometimes active when viewing the tomato. Lewis, for example, is decidedly unconcerned about one-off or sporadic cases²⁸, what matters is whether an

²⁸See e.g. Lewis’s Deathbed Cure and Loose Wire cases (1980, p. 244).

experience matches and does so by luck. Taking this as our lead, it is again hard to see why sporadic telekinetic chains are inherently defective, when the Matching condition is persistently met.

In short, the standard dialogue that arises from these kinds of cases has no traction within Ecumenical Relationalism. The fact that Cohen's telekinetic tomato example is standardly viewed as involving deviant chains, and thus non-veridical colour experiences, thus cannot simply be imported into the Ecumenical Relationalist account of colour illusion. To justify the claim that some type of causal chain is deviant, the Ecumenical Relationalist must provide an internal justification. None has been offered. Let me make one more claim about deviant chains.

There are a class of cases in the deviant causal chain literature that by design involve perceptual experiences that are intuitively hallucinatory yet match and are caused in some "indirect way" by the target object (*Matching Hallucinations*). An influential case involves a mad scientist that is directly manipulating your brain so that you have a hallucination that matches a clock on the wall that you are looking toward (Strawson, 1974).²⁹ Can the Ecumenical Relationalist argue that this kind of case involves illusory colour experience? No. Importantly, the argument in favour of categorizing these kinds of cases as erroneous rests not merely on the oddness of causal chain, but more directly on the fact that the experiences are by hypothesis *hallucinatory*. This is why the cases are standardly regarded not as examples of colour illusion but of matching colour hallucination. For that reason, I will return to the case when I discuss hallucinations in §6.

5.3 Generalizing the worry

To see how quickly the worry just expressed generalizes, briefly consider synaesthesia. There are numerous types of colour synaesthesia (see Brogaard, 2021 for a current review). For simplicity consider a form of colour-grapheme synaesthesia in which persons experience specific letters to have specific colours, for example 'A' is experienced as blue, 'B' as orange, and so on. There is intuitively a weirdness to this causal chain, even though the target objects (i.e. the letters) are the consistent, external causes of the colour experiences. Setting this weirdness aside for a moment, the simple explanation for why these kinds of experiences are erroneous is that, on most views, specific letters don't have specific colours: e.g. 'A' is *not* always blue, 'B' is not always orange, and so on. Yet this explanation is unavailable to the Ecumenical Relationalist given their commitment to Universal Colour Pluralism. If the Ecumenical Relationalist wishes to maintain that instances of colour-grapheme synaesthesia are erroneous she must rely on the oddness of the

²⁹A modified version holds that the scientist induces an hallucination matching that clock *because* you are looking toward that clock, which arguably makes the hallucination counterfactually sensitive in ways Lewis would insist upon (Noë, 2003). A related variant is the suite of Indian Cobra cases in Arstila and Pihlainen (2009).

causal mechanism, and this is indeed the strategy taken by Cohen (2012, pp. 369–370).³⁰ As above, the difficulty is that her critic can argue that the neural oddity that makes these persons experience ‘A’ as blue (etc.) is, given Ecumenical Relationalism, not inducing colour illusions but *revealing* colours the letters by hypothesis have. Thus, I again think it is difficult for the Ecumenical Relationalist to take on board the intuitive analysis of the case via the argument from “naturalness”.

I suggest that a similar analysis can be put forward for a host of additional cases that are typically regarded as illusory due to “mismatched” colour experiences triggered by cognitive-neural effects. This would include cases in which memory colour influences colour experiences to depart from the intuitively correct colour (Macpherson, 2012), cases in which neural deficits (e.g. aneurisms) either consistently or sporadically affect experienced colours of things, and so on.

I conclude that, despite how intuitive it is to deem Cohen’s telekinetic scenario as illusory, Cohen has not found a workable justification for this claim. I further maintain that the point generalizes: a host of other types of colour experiences that are standardly regarded as erroneous are blocked from being justifiably categorized this way within Ecumenical Relationalism. Cohen’s account of colour illusion thus fails. One final example comes from Chirimuuta’s account.

5.4 Low-contrast scenarios

Chirimuuta argues that “low-contrast scenarios” generate colour illusions (2015, p. 181). The underlying insight is that, with regard to stimulus information, colour visual systems are in many ways specifiable as wavelength discriminating systems, as this is what they allow sensory systems to do with incoming signals.³¹ Scenarios with poor wavelength information in sensory signals (where “poor” is defined relative to the capacities of a given type of colour visual system) prevent a given colour visual system from doing its job. Thus, colour states arising in those scenarios are non-veridical. Chirimuuta offers two examples: (a) conditions of low or dim illumination, where things look grainy and grey; and (b) when one looks at a room illuminated by green light and experiences everything to be black or various shades of green. In these sorts of cases, it is argued, our colour visual systems perform sub-optimally due to environmental factors, thus we shouldn’t regard the experienced colours as “real” (2015, p. 181). This is therefore a colour-specific case that is motivated by a sound theoretical insight and arguably captures the intuitive judgement that there is colour illusion. Nonetheless, this conclusion should be resisted, both on general grounds and as a justifiable claim within Ecumenical Relationalism. I consider these in turn.

³⁰Note that Cohen (2012) is responding to Allen’s charge that if the Ecumenical Relationalist claims that synaesthetic experiences of this sort are veridical, they would be committing themselves to a claim that “doesn’t seem especially plausible” (Allen, 2012, p. 336). Nothing in the text rests on Allen’s charge.

³¹For simplicity set aside the question of whether there can in addition be “non-visual” detection systems that operate on wavelength information.

Setting aside Ecumenical Relationalism, note the technical fact that adjusting the spectral power distribution of the illuminant often can and does bring out some colours and suppress others. Gardeners are quick to report that in twilight blues “pop out” and reds fade to black. This is the result of selectively diminished wavelength information (relative to fuller daylight) that over-emphasizes the short wavelength “blue” information and contains minimal long wavelength “red” information. The result is a scenario where it is easier for our colour visual systems to process the blues in part because the “blue” wavelength information isn’t getting washed out by the other wavelength information present in fuller daylight. To be sure, there is diminished colour information in such lighting conditions, and as a result our colour visual systems are able to do less with those signals, but this doesn’t entail error. Similarly, in monochromatic green light one tends to experience most objects as green. One interpretation of this is as a colour illusion where you experience various non-green things to be green. A different, and in my view more illuminating, interpretation is that you experience the light to be green and, because of the dominance of the illuminant colour, the object colours are occluded from view (Brown, 2014). On this latter interpretation no illusion occurs.

Let me also offer an internal critique that makes it hard to justify Chirimuuta’s analysis within Ecumenical Relationalism. Chirimuuta generally allows that illumination variations that impact colour experience do so veridically (e.g. one might veridically perceive something to be white under one illuminant and blue under another). Why doesn’t this apply to green lit rooms? If we accept Universal Colour Pluralism, then all objects have every colour and thus all objects are green. Why not regard a green lit room as one way of “bringing out” the greenness of various things? Similarly, why not regard a dimly lit room as one way of “bringing out” the greyness of various things? Scenarios with wavelength information that is limited or poor relative to a given colour visual system can be regarded as scenarios that nudge such a system to select a specific subset of the world’s infinite colours, as opposed to scenarios that prevent the system from accessing any of the world’s real infinite colours. For these reasons “low-contrast scenarios” are not a good example of a colour illusion for Ecumenical Relationalists.

5.5 Conclusion

I conclude that the Ecumenical Relationalist attempt to carve-off a small but legitimate class of colour illusions fails. Given how restricted the range of proposed cases is, and how broad the class of veridical colour experiences is within the view, it is unlikely that there are other cases to consider. Therefore, within Ecumenical Relationalism, there are no illusions of colour experience.³² This yields a general conclusion: within Ecumenical Relationalism, as soon as a colour experience is *Connected* – is caused by the object of the experience in some perceptual condition

³²As before, the Ecumenical Relationalist, like the Eliminativist, can still explain some purported examples of illusion by reference to errors in cognitive (i.e. post-perceptual) judgement.



– it is veridical. The Ecumenical Relationalist notion of “inappropriate” conditions or experiences has no application among *Connected* colour experiences. Before assessing the significance of this (§7) I turn to *Disconnected* experiences (§6).

6 Disconnected experiences

Assume the above argument is correct and thus that within Ecumenical Relationalism all *Connected* colour experiences – experiences of objects that are caused by those objects in some perceptual condition – are veridical. One would be right to ask whether this commitment is problematic on its own. Set that question aside for a moment (see §7). The reason is because, even if this commitment is found wanting, the Ecumenical Relationalist might try to justify their distinction between veridical and non-veridical experience account by appeal to the remaining instances of the latter. The remaining non-veridical experiences are *Disconnected* experiences (i.e. some combination of hallucinations, phosphenes, afterimages and dreams). Perhaps examining the *difference* between *Connected* and *Disconnected* experiences can motivate an underlying distinction between veridical and non-veridical experience. Intuitively, the thought is that surely colour hallucinations, phosphenes, dreams and afterimages are non-veridical and other colour experiences must be fundamentally semantically different from this (and thus veridical). My aim in this section is to neutralize this intuition, so that I can make an overall assessment in §7.

The argument at issue can be formulated as follows:

- (1) *Disconnected* colour experiences are non-veridical.
- (2) *Disconnected* colour experiences are identifiably different from *Connected* colour experiences.
- (3) The difference between *Disconnected* and *Connected* colour experiences justifies categorizing them differently with regard to veridicality.
- (4) Therefore, *Connected* colour experiences are veridical.

While there are contexts where this kind of reasoning can be quite compelling, in this case it should be resisted.

There are internal, pretheoretical and theoretical reasons that the Ecumenical Relationalist can offer in support of (1). The internal reason stems from the idea that Ecumenical Relationalists must regard *Disconnected* experiences as non-veridical because, by stipulation, colours belong to objects, and the experiences at issue are “disconnected” from these objects. In effect (1) is analytic of Ecumenical Relationalism and thus justified to the extent that the broader view is justified. However, assuming the criticisms of Ecumenical Relationalism I have put forward to this point are successful, the broader view is in need of justification. Thus, this

internal justification for (1) carries no weight. *Disconnected* colour experiences are nonetheless often deemed non-veridical pretheoretically, in many if not most theories of colour perception, and by the Eliminativist. I thus propose we accept (1).

Regarding (2), there are many differences between *Disconnected* and *Connected* colour experiences one might examine but our focus needs to be on differences that can help justify the veridicality of *Connected* experiences. An obvious rough starting point is the fact that *Connected* experiences are causally-connected to objects via perceptual conditions and *Disconnected* ones are not. From here the Ecumenical Relationalist might argue, in defense of (3), that this difference in causal-connectedness is often regarded as a critical line of demarcation between perceptual veridicality and non-veridicality and should be in this case as well. I hope the following analysis, though somewhat oversimplified, will suffice to indicate why I don't believe any way of fleshing out this generic argument is successful in this context.

First, the fact that causal-connectedness is often *in general* regarded as a critical line of demarcation in distinctions between perceptual veridicality and non-veridicality only yields incomplete justification for (3). This is because it is widely believed (see §§4&5) that causal-connectedness is a necessary but not sufficient condition for veridicality in perception, as revealed by the vast literature on perceptual illusion. Thus, even if *Disconnected* and *Connected* colour experiences are different in a semantically-important way, it doesn't follow that we should generally regard *Connected* colour experiences as veridical of colour, and, on most accounts, several *Connected* colour experiences are non-veridical. To help illustrate the point, consider a different option. Suppose objects are coloured but that all *Connected* colour experiences are illusory, and all *Disconnected* ones are hallucinatory. Here, there are colours in the environment, but they are perceptually transcendent – we never experience them correctly. Advocates of such a view would reject (3).

Second, the Eliminativist rejects (3) and does so for independently viable reasons. The Eliminativist recognizes the semantic-import of causal-connectedness in perception and uses this to help illuminate the *value* of colour vision and colour experience, even though (according to the Eliminativist) nothing in one's surrounding environment has colour. Recall (§2) that the eliminativist is committed to:

Theoretically neutral values of colour experience: this includes various adaptive, epistemic, social and practical uses of colour experience regardless of one's colour ontology.

The *epistemic* value is of particular relevance to the current discussion. Regardless of one's colour theory, colour experience can and does, to varying degrees, afford perceptual information about objects and *non-colour* properties. Colour experience can help discern object boundaries and shapes, track and identify objects, distinguish surface cues from illumination cues, and so on. Indeed Chirimuuta (2015), an Ecumenical Relationalist, makes this point extensively. In turn, there

are many scenarios where colour experience fails, in varying degrees, to assist with these endeavours.

While all colour theories can accept these values, for the Eliminativist they are of particular importance because they help relieve pressure the Eliminativist otherwise faces to regard any colour experiences as veridical. The Eliminativist can distinguish epistemically “good” colour experiences from “bad” ones by reference to how well an experience informs the subject about *non-coloured* objects and *non-colour* properties. What she denies is a distinction between veridical and non-veridical *colour* experience. To apply this to our current discussion, the Eliminativist regards *Disconnected* colour experiences as generally *uninformative* because they are causally disconnected from any relevant part of the environment.³³ *Connected* colour experiences categorically have more epistemic potential to be informative about non-colour objects and properties in one’s environment. But they are not infallible. *Connected* colour experiences can succeed and fail to be informative of non-colour objects and properties in interesting ways. Thus, for the Eliminativist several standard examples of colour illusions are *Connected* colour experiences in which the experienced colours poorly inform the subject about the target non-colour objects and properties. For example, the neon colour spreading illusion suggests object boundaries where there are none, the Hermann grid uses colour experience to suggest objects (i.e. dots at grid intersections) that do not match any objects, and so on.

A detailed discussion of these matters would be helpful, but I hope it isn’t needed to appreciate the key point. Eliminativists accept (2) and propose an alternative to (3):

(3*) The difference between *Disconnected* and *Connected* colour experiences justifies categorizing them differently with regard to their respective informativeness of non-colour objects and properties.

(3*) captures a key insight that motivates (3), but when (3*) replace (3) in the argument, the inference to (4) is blocked.

(3) is thus subject to general criticism, and the very credible (3*) captures a central motive for (3). (3) should therefore be rejected. It follows that the division between *Disconnected* and *Connected* colour experiences cannot on its own underpin the division between veridical and non-veridical colour experience. Let me, at last, turn to an overall assessment.

³³There are important caveats to this that fall outside our purview. For example, dreams, hallucinations and other *Disconnected* experiences can contain useful non-colour information about things those experiences represent, and they can contain colour information about the colours one would experience were one to view what is represented. These kinds of qualifications are easily handled by Eliminativists, Ecumenical Relationalists and various other theorists.

7 Overall assessment

Colour variation is the various colours a given object is experienced to have across the full range of perceptual conditions and the full range of perceivers. It is widespread. Both Eliminativists and Ecumenical Relationalists offer colour variation as a critical source of justification for their respective views. Their interpretations of colour variation agree in several key respects. Both agree that colour variation persists in a range of cases within and outside any suitable specification of “normal” conditions and perceivers and, further, that the cases are so varied and widespread that there is no principled reason to treat one experienced colour of an object as most accurate (No Privilege). They also agree that because of this we should treat numerous colour variants as equally accurate (Ecumenicism). Finally, they agree that the best explanation of these facts requires asserting that colours are not objective or mind-independent. Their disagreement concerns whether to regard the range of cases of colour variation as all veridical (Ecumenical Relationalism) or as all non-veridical (Eliminativism). Which interpretation should we prefer?

To begin, both Eliminativists and Ecumenical Relationalists accept that *Dis-connected* colour experiences (e.g. hallucinations and dreams) are non-veridical. I suggest the root justification for this claim is that these experiences are not, unless by chance, actively caused by the objects they are about, and thus a basic condition for perceptual veridicality – the Causal condition – is not met.

Assuming my analysis in §5 is correct, Ecumenical Relationalists do not have a viable account of colour illusion. This entails that all colour experiences that are caused by their perceptual objects are veridical (regardless of whether the causal chain is standardly categorized as deviant). That is, all *Connected* colour experiences are veridical within Ecumenical Relationalism. By contrast, Eliminativists maintain that all *Connected* colour experiences are illusory: *Connected* experiences attribute colours to objects causing those experiences, despite those objects not (according to Eliminativism) having colours. Our debate between Eliminativists and Ecumenical Relationalists thus settles on the following question:

Should we regard *Connected* colour experiences as wholly veridical or as wholly illusory? Put another way: Do objects have colour?

One might intuitively prefer Ecumenical Relationalism because it is, in principle, better to endorse a theory that contains veridical colour experiences to one that does not. There are several ways to unpack this intuition, none of which are convincing in this case. First, note that veridicality is not a virtue in and of itself. For example, it is intuitive to pursue theories of the imagination (or sci-fi works or imaginary numbers and so on) that are built around the non-veridicality of imaginings (or sci-fi works, etc.): things don't become true just because we make them up. However, one might think that *perception* is different. One might, for example, argue that the outputs of perceptual system should by default be regarded as veridical because the purpose or adaptive function of perceptual systems is to inform us

about our environment. This argument is subject to numerous objections, many of which involve arguing that adaptive systems have to “work” (i.e. improve fitness), they do not in principle need to issue truthful verdicts about the environment. In my judgement, progress on this kind of debate requires examining the details of a given case. In the present instance, two points are relevant.

First, in §§2&6 I emphasized the importance of the *Theoretically Neutral Values of colour experience*. Colour experience is enormously beneficial even if it doesn’t detect colours of objects. These values are thus sufficient to ground a purpose for colour vision and for colour experience. If additional adaptive value emerges from adding that colour experience is often veridical, that value needs to be specified by the Ecumenical Relationalist. Given that no such purported adaptive value has been proposed, and that Ecumenical Relationalists like Chirimuuta (2015, esp. ch. 4) instead emphasize the *Theoretically Neutral Values*, the burden is on the Ecumenical Relationalist to make her case.

Second, when considering whether to interpret *Connected* experiences as wholly veridical or as wholly non-veridical, the proposed conceptions of veridicality and non-veridicality are important. I believe that the conception of veridicality on offer by Ecumenical Relationalists is inferior to the Eliminativist conception of non-veridicality. Let me explain why. I begin with a general argument in favour of the Eliminativist, and then outline one way it might be developed.

We are assuming that within Ecumenical Relationalism all *Connected* experiences are veridical. It follows that every colour experience that is caused by its object is veridical. This is decidedly close to the claim that colour experiences are veridical by virtue of being caused by their objects. A key worry is that the denial of this claim is at the core of Eliminativism. All agree that objects routinely cause us to have colour experiences of them. Setting aside Ecumenical Relationalists, arguably all agree that this alone is not sufficient to deem these colour experiences to be veridical. Veridicality of perceptual states must amount to more than this. At this point, Eliminativists assert that, from the details of phenomena like colour variation we learn that there is a decidedly unsystematic relationship between objects, perceptual conditions and induced colour experiences. In the absence of a systematic relationship, objects are *merely* causes of our various colour perceptions of them – objects have no more systematic a role in colour experience than this bare causal role. If this is the case then, the Eliminativist continues, colour experiences are not veridical of objects, for veridicality must amount to more than this. Let me develop this line of argument.

First, one might wonder whether the appropriate response is to suggest that Eliminativists and Ecumenical Relationalists are stuck in a verbal disagreement: Eliminativists are thinking of veridical experience in a slightly “thicker” way than Ecumenical Relationalists. Perhaps we should, the thought continues, be ecumenical when considering differing conceptions of veridical experience. I admit this is a possible line of response. However, I don’t think this response is welcome to Ecumenical Relationalists. They want their view to have more substance than

this. They want their claim that objects have colour to not boil down to a stipulative definition that can be reached by merely taking the Eliminativist framework and swapping ‘veridical’ for ‘non-veridical’ when considering *Connected* experiences. Further, given how wide the veridicality conditions are within Ecumenical Relationalism – covering all *Connected* experiences – there is a burden on the Ecumenical Relationalist to show that this conception of veridicality has substance.

Second, one can imagine a situation in which it is appropriate to endorse the veridicality of all *Connected* experiences and use this as a test case against our own situation. Thus, consider a world in which:

- (a) Each object has one unique, intrinsic colour.
- (b) When a perceiver has a colour experience of an object, they experience precisely that object’s colour. That is, *Connected* experiences always “match” their object colour.
- (c) The general mechanics of perception otherwise work the same as they do in our world (see below for detail).

Call this the *World of Stable Colour Experience* (or *Stable World*).

Stable World is arguably a world in which we should conclude that there are no colour illusions.³⁴ However, this conclusion isn’t reached by stipulating that whenever an object causes a perceiver to have a colour experience of it the experience is “correct”. Instead, given (a) and (c), the fact that visual systems output *Connected* colour experiences that always match their object colours is a *monumental* achievement. Visual systems must, subconsciously, control – perfectly – for all variations in perceptual conditions (e.g. variations in lighting, angle of viewing, etc.) and control – perfectly – for all variations perceptual systems (e.g. variations in cone absorption curves, etc.). In this world, *Connected* experiences always match object colour, but do so via an epistemic system that not only achieves perfect results, but overcomes numerous hurdles to get there in each instance. There are no colour illusions in *Stable World* because, for *Connected* experiences, the matching condition is always satisfied and, crucially, satisfying it is a remarkable epistemic achievement. We understand very well what it would take for a *Connected* colour experience to be non-veridical in this world, it just happens that visual systems are able to perfectly avoid such experiences.

In *Stable World*, all *Connected* experiences seem veridical. Suppose the Eliminativist tries to deny this. She insists that all *Connected* experiences cannot be veridical, because, if they were, it would entail that objects *merely* cause perceivers to have colour experiences of them, and this is insufficient to ground veridicality. This Eliminativist position would be untenable precisely because this description

³⁴That is, there are no illusions of colour *experience*. There could still be errors in post-perceptual judgements about colour, as stressed above, and for some this would be a non-perceptual kind of illusion.

ignores the remarkable epistemic achievement required for all *Connected* experiences to match object colours in *Stable World*. Thus, the Eliminativist critique of the Ecumenical Relationalist conception of veridicality doesn't strictly follow from the idea that all *Connected* experiences are veridical within Ecumenical Relationalism. If our world is appropriately analogous to that of *Stable World*, the Ecumenical Relationalist can resist the Eliminativist challenge.

I hope it is plain that the analogous situation in our world is at the other extreme from *Stable World*. In our world, unlike in *Stable World*, colour experiences are highly sensitive to key features of objects, various dimensions of perceptual conditions, and various dimensions of perceptual apparatuses. That is, in our world variation in colour experience is robust and in need of explanation. This is the kind of scenario in which one would expect that *Connected* colour experiences could fail to correctly represent colour. Despite this, within Ecumenical Relationalism all *Connected* experiences are veridical.

How, according to Ecumenical Relationalism, do our visual systems achieve epistemic perfection for every *Connected* experience? The matching condition is trivially satisfied by all *Connected* experiences because of Universal Colour pluralism, an ontological postulate that is the opposite of *Stable World*, where each object has a unique colour. Assuming §5 is correct, the causal condition is also trivially satisfied by all *Connected* experiences. This is because in our world Ecumenical Relationalists are committed to interpreting such a wide array of colour variations as veridical, that they retain no resources to block any *Connected* experience from being causally adequate with regards to veridicality.

Thus, for Ecumenical Relationalists, in our world all *Connected* experiences are veridical, but this is not the remarkable epistemic achievement that it is in *Stable World*. The achievement is instead seemingly vacuous. There is no identifiable sense in which *Connected* colour experiences detect, track or epistemically "lock onto" colour. We aren't even sure what would count (in our world), in principle, as a non-veridical *Connected* colour experience within the Ecumenical Relationalist framework.

It is at this point that the Eliminativist response has traction in a way that it doesn't within *Stable World*. The Eliminativist insists that in our world the Ecumenical Relationalist conception of veridicality is indeed vacuous because, within Ecumenical Relationalism, satisfying the matching and causal conditions requires no substantive epistemic achievement beyond an experience being *Connected*. Without a systematic relationship between objects, perceptual conditions, and induced colour experiences that can be leveraged to put substance on the proposed conception of veridicality, the Eliminativist is right to insist that the Ecumenical Relationalist conception of veridicality should be resisted. In this case objects do seem to *merely* have the power to cause us to have colour experiences of them, and thus we should deem these *Connected* experiences to all be non-veridical.

In sum, the Eliminativist would be wrong to insist that all *Connected* experiences cannot be veridical. They can be. In *Stable World* this is achieved by a mirac-

ulous type of perceptual system that perfectly controls for all potential variations in perceptual conditions and apparatuses. The Eliminativist should be happy to accept this conclusion, for this scenario rests on a kind of epistemic miracle that has no bearing on our world. In our world colour experience is much messier than this. For all *Connected* experiences to be veridical in our world a different sort of miracle is required: we must permit a notion of perceptual veridicality whose matching and causal conditions are trivially satisfied for every colour experience that is about its object. The Eliminativist is right to dig in here and insist that the correct response is not to regard all such experiences as veridical, but to instead regard them all as non-veridical.³⁵

This conclusion about the Ecumenical Relationalist conception of veridical experience infects the justification for their colour ontology. The reason is because on this view colours are defined in terms of the relations that constitute veridical colour experiences. Recall (see §3):

(B*) object o_1 is colour c_1 iff there is a set (of one or more) appropriate conditions in which o_1 causes the members of some set (of one or more) of appropriate perceivers to perceptually experience o_1 as c_1 .

On this account veridicality is defined in terms of appropriateness such that colour experiences had by appropriate perceivers in appropriate conditions are thereby veridical and are otherwise non-veridical. Since introducing (B*) in §3 I have argued that this account of veridicality is unacceptable, in part by arguing (§5) that the conception of “appropriateness” on which it is based cannot be justified. The consequence for the ontology is that what is for an object to have a colour is simply for it to have the power to induce a *Connected* colour experience in a perceiver. That is, for an object to have a colour is for it to be able to cause a perceiver (via reflecting light into retinas or telekinesis or whatever) to have an experience of it as coloured. This, I submit, is far too weak a conception of colour. If all objects do with regards to colour is cause us to have colour experiences of objects, then objects aren’t coloured. The Eliminativist view is preferable.

8 Concluding thoughts

Colour variation is the fact that what colour a physical object looks to have depends, in quite wide-ranging and striking ways, on viewing conditions and a per-

³⁵Readers might be wondering about how naïve realism fits into this discussion, as naïve realists are generally resistant to the existence of perceptual illusions. For example, naïve realist Kalderon (2011) has argued that there are no colour illusions. In this regard the Ecumenical Relationalist has an ally of sorts. However, the alliance is limited. Kalderon believes in objective, mind-independent colours, in contrast to the relationalist, and Kalderon’s proposed mechanisms for handling purported cases of colour illusion are correspondingly very different from those discussed to this point. In addition, in my judgement Kalderon and other naïve realists have not considered a host of tough cases of colour illusion, so the naïve realist account is (at present) only of limited value (see e.g. Brown, n.d., in preparation).

ceiver's visual system. How should we interpret this phenomenon? To focus the discussion, I have assumed that there is no principled reason to treat one experienced colour of an object as most accurate (No Privilege), and thus that we should treat numerous colour variants as equally accurate (Ecumenicism). The question then becomes whether we should regard all variants as veridical (as the Ecumenical Colour Relationalist contends) or as non-veridical (as the Colour Eliminativist contends)? I am not sure how systematic the relationship must be between colour experiences, objects and perceptual conditions to justify the veridicality of all of these variants. However, the degree of systematicity found within Ecumenical Relationalism falls well short of any reasonable standard. As such, the Ecumenical Relationalist conception of veridicality, particularly given the failure of their account of illusion (§5), is vacuous (§7). Further, the account cannot be salvaged by appeal to the non-veridicality of hallucinations, dreams and the like (§6). While this can be read as a wholly critical argument, in my judgement that would be a mistake. The reason is because the pressure to jettison the Ecumenical Relationalist conception of veridicality is pressure to precisely embrace the Colour Eliminativist framework. In the face of our messy colour experiential world, the Eliminativist asserts that there is no adequately systematic relationship between colour experiences, objects and perceptual conditions. It follows that, although objects routinely cause us to experience colours, that is all they do regarding colour. Thus, we should embrace the conclusion that colour experiences are not veridical of objects. The Eliminativist analysis of colour variation is superior to the Ecumenical Relationalist analysis.

There are other phenomena that one might consider when assessing Eliminativism and Ecumenical Relationalism on their own or in relation to one another. Some of these were mentioned above, such as the structure of colour, the analysis of Common Sense Colour claims (e.g. blueberries are blue), and so on. In my judgement, relative to Ecumenical Relationalism, Eliminativism maintains a strong standing. For example, at this point it should be straightforward to readers that Ecumenical Relationalist colours – highly relativized features of which every object has an infinite number – are not well suited to directly explain Common Sense Colour claims. Cohen recognizes this and provides a reconstructive analysis (2009, ch. 4) that is no less revisionary than existing Eliminativist proposals. There is thus an implicit recognition that Ecumenical Relationalism is in some ways “as extreme” as Eliminativism. A thorough analysis of these other issues obviously extends outside my purview. My hope, however, is that the present analysis succeeds in elevating the credibility of Colour Eliminativism, and in turn motivating further development of the view.

Let me conclude by reasserting that the above argument specifically concerns how we should interpret colour variation on the assumption that the phenomenon provides adequate grounds to reject Objective Colour Realism. Colour variation is important on its own right, but it is absolutely central to views, like Colour Eliminativism and Ecumenical Colour Relationalism, that reject Objective Colour

Realism. This being said, Eliminativism shouldn't be rejected by Objective Colour Realists because it ascribes error to colour experiences or because it asserts that objects aren't coloured. It should be assessed on the value of its explanation of key phenomena like colour variation. On this measure, relative to Ecumenical Relationalism, Eliminativism is superior. How does the Eliminativist analysis of colour variation fare relative to Objective Colour Realist ones? As readers might expect, I find that existing Objective Colour Realist analyses of colour variation leave much to be desired. However, examining those details requires a separate work.³⁶

References

- Adams, Z., & Hansen, N. (2020). The myth of the common sense conception of color. In A. M. Wikforss & T. (Eds.). *Shifting Concepts: The Philosophy and Psychology of Conceptual Variability* (106-127). Oxford University Press.
- Akins, K. A., & Hahn, M. (2014). More than mere colouring: The role of spectral information in human vision. *The British Journal for the Philosophy of Science*, 65(1), 125–171. <http://www.jstor.org/stable/24562869>
- Allen, K. (2012). Colour, contextualism, and self-locating contents. *Croatian Journal of Philosophy*, 12(3). <https://doi.org/10.5840/croatjphil201212324>
- Allen, K. (2016). *A Naïve Realist Theory of Colour*. Oxford University Press.
- Arstila, V., & Pihlainen, K. (2009). The causal theory of perception revisited. *Erkenntnis*, 70(3), 397–417. <https://doi.org/10.1007/s10670-008-9153-7>
- Averill, E. W. (2005). Toward a projectivist account of color. *Journal of Philosophy*, 102(5), 217–234. <https://doi.org/10.5840/jphil2005102525>
- Boghossian, P. A., & Velleman, J. D. (1989). Colour as a secondary quality 1. *Mind*, XCVIII(389), 81–103. <https://doi.org/10.1093/mind/XCVIII.389.81>
- Bradley, P., & Tye, M. (2001). Of colors, kestrels, caterpillars, and leaves. *The Journal of Philosophy*, 98(9), 469. <https://doi.org/10.2307/2678495>
- Briggs, D. (2021). Colour spaces. In D. H. Brown & F. Macpherson (Eds.), *The Routledge Handbook of Philosophy of Colour* (140–156). Routledge Taylor & Francis Group. <https://doi.org/10.4324/9781351048521-12>
- Brogaard, B. (2021). Colour synaesthesia and its philosophical implications. In D. H. Brown & F. Macpherson (Eds.), *The Routledge Handbook of Philosophy of Colour* (210–225). Routledge Taylor & Francis Group. <https://doi.org/10.4324/9781351048521-16>
- Brown, D. H. (2006). On the dual referent approach to colour theory. *The Philosophical Quarterly*, 56(222), 96–113. <https://doi.org/10.1111/j.1467-9213.2005.00431.x>
- Brown, D. H. (2014). Colour layering and colour constancy. *Philosophers*, 14. <https://philpapers.org/rec/BROCLA-2>
- Brown, D. H. (2015). Colour layering and colour relationalism. *Minds and Machines*, 25(2), 177–191. <https://doi.org/10.1007/s11023-015-9363-0>
- Brown, D. H. (2017). Colouring for and colour relationalism. *Analysis*, 77(2), 433–449. <https://doi.org/10.1093/analysis/anx025>
- Brown, D. H. & Macpherson, F. (ms). *The limits of objective explanations of illusions: A case study in naive realism*.
- Byrne, A., & Hilbert, D. R. (2003). Color realism and color science. *The Behavioral and Brain Sciences*, 26(1), 3-21; discussion 22-63. <https://doi.org/10.1017/S0140525X03000013>
- Byrne, A., & Hilbert, D. R. (2021). Objectivist reductionism. In D. H. Brown & F. Macpherson (Eds.), *The Routledge Handbook Of Philosophy of Colour*. Routledge Taylor & Francis Group. <https://philpapers.org/rec/BYROR>

³⁶For helpful discussion I am indebted to Keith Allen, Christoph Kelp, Fiona Macpherson, Glen Pettigrove, Adam Rieger, and to audiences at the Universities of Dubrovnik, Glasgow, Milan, and Tokyo. I also benefited greatly from two anonymous referees for this journal and from the journal editor.



- Campbell, J. (1993). A simple view of colour. In John J. Haldane & C. Wright (Eds.), *Reality: Representation and Projection* (257–268). Oxford University Press.
- Chalmers, D. J. (2006). Perception and the fall from eden. In T. S. Gendler & J. Hawthorne (Eds.), *Perceptual Experience* (49–125). Oxford University Press.
- Chirimuuta, M. (2015). *Outside Color: Perceptual Science and The Puzzle of Color in Philosophy*. The MIT Press.
- Cohen, J. (2004). Color properties and color ascriptions: A relationalist manifesto. *The Philosophical Review*, 113(4), 451–506. <http://www.jstor.org/stable/4147999>
- Cohen, J. (2007). A relationalist's guide to error about color perception. *Noûs*, 41(2), 335–353. <https://doi.org/10.1111/j.1468-0068.2007.00650.x>
- Cohen, J. (2009). *The Red and the Real: An Essay on Color Ontology*. Oxford University Press.
- Cohen, J. (2012). Redness, reality, and relationalism: Reply to Gert and Allen. *Croatian Journal of Philosophy*, 12(3). <https://philpapers.org/rec/COHRRRA-3>
- Cohen, J. (2015). Ecumenicism, comparability, and color, or: How to have your cake and eat it, too. *Minds and Machines*, 25(2), 149–175. <https://doi.org/10.1007/s11023-014-9354-6>
- Cohen, J., & Nichols, S. (2010). Colours, colour relationalism and the deliverances of introspection. *Analysis*, 70(2), 218–228. <https://doi.org/10.1093/analys/anp161>
- Gatzia, D. E. (2010). The individual variability problem. *Philosophia*, 38(3), 533–554. <https://doi.org/10.1007/s11406-009-9234-0>
- Gert, J. (2017). *Primitive colors: A case study in neo-pragmatist metaphysics and philosophy of perception*. Oxford University Press USA. <https://ebookcentral.proquest.com/lib/kxp/detail.action?docID=4883863>
- Hardin, C. L. (1988). *Color for philosophers: Unweaving the rainbow*. Hackett.
- Hardin, C. L. (1992). The virtues of illusion. *Philosophical Studies*, 68(3), 371–382. <https://doi.org/10.1007/BF00694852>
- Hilbert, D. R. (1992). What is color vision? *Philosophical Studies*, 68(3), 351–370. <https://doi.org/10.1007/BF00694851>
- Johnston, M. (1992). How to speak of the colors. *Philosophical Studies*, 68(3), 221–263. <https://doi.org/10.1007/bf00694847>
- Kalderon, M. E. (2007). Color pluralism. *Philosophical Review*, 116(4), 563–601. <https://doi.org/10.1215/00318108-2007-014>
- Kalderon, M. E. (2011). Color illusion. *Noûs*, 45(4), 751–775. <https://doi.org/10.1111/j.1468-0068.2010.00781.x>
- Langsam, H. (2000). Why colours do look like dispositions. *The Philosophical Quarterly*, 50(198), 68–75. <https://doi.org/10.1111/1467-9213.00168>
- Levin, J. (2000). Dispositional theories of color and the claims of common sense. *Philosophical Studies*, 100(2), 151–174. <https://doi.org/10.1023/A:1018660204635>
- Lewis, D. (1980). Veridical hallucination and prosthetic vision. *Australasian Journal of Philosophy*, 58(3), 239–249. <https://doi.org/10.1080/00048408012341251>
- Lewis, D. (1997). Naming the colours. *Australasian Journal of Philosophy*, 75(3), 325–342. <https://doi.org/10.1080/00048409712347931>
- Macpherson, F. (2012). Cognitive penetration of colour experience: Rethinking the issue in light of an indirect mechanism. *Philosophy and Phenomenological Research*, 84(1), 24–62. <https://doi.org/10.1111/j.1933-1592.2010.00481.x>
- Macpherson, F., & Batty, C. (2016). Redefining illusion and hallucination in light of new cases. *Philosophical Issues*, 26(1), 263–296. <https://doi.org/10.1111/phis.12086>
- Marshall, D. & Weatherston, B.n (2018). Intrinsic vs. extrinsic properties. In Edward N. Zalta (Ed). *The Stanford Encyclopedia of Philosophy (Spring 2018 Edition)*. <https://plato.stanford.edu/archives/spr2018/entries/intrinsic-extrinsic/>.
- Matthen, M. (1999). The disunity of color. *The Philosophical Review*, 108(1), 47. <https://doi.org/10.2307/2998260>
- Maud, B. (1981). Colour — a case for conceptual fission. *Australasian Journal of Philosophy*, 59(3), 308–322. <https://doi.org/10.1080/00048408112340271>
- Maud, B. (1995). *Colours: Their Nature and Representation*. <https://philpapers.org/rec/MAUCTN-3>
- Maud, B. (2006). The illusory theory of colours: An anti-realist theory. *Dialectica*, 60(3), 245–268. <https://doi.org/10.1111/j.1746-8361.2006.01058.x>
- Maud, B. (2012). Colour relationalism and colour irrealism/eliminativism/fictionalism. *Croatian Journal of Philosophy*, 12(3). <https://philpapers.org/rec/MAUCRA-4>
- McGilvray, J. A. (1994). Constant colors in the head. *Synthese*, 100(2), 197–239. <https://doi.org/10.1007/BF01063810>
- McGinn, C. (1986). The subjective view. Secondary qualities and indexical thoughts. *Tijdschrift Voor Filosofie*, 48(2). <https://philpapers.org/rec/MCGTSV-7>
- McLaughlin, B. (2003). The place of color in nature. In Rainer Mausfeld & Dieter Heyer (Eds.), *Colour Perception: Mind and the Physical World*. <https://philpapers.org/rec/MCLTPO-5>



- Noë, A. (2003). Causation and perception: The puzzle unraveled. *Analysis*, 63(2), 93–100. <https://doi.org/10.1093/analys/63.2.93>
- Pautz, A. (2006). Can the physicalist explain colour structure in terms of colour experience?. *Australasian Journal of Philosophy*, 84(4), 535–564. <https://doi.org/10.1080/00048400601079094>
- Pautz, A. (2007). Intentionalism and perceptual presence. *Philosophical Perspectives*, 21(1), 495–541. <https://doi.org/10.1111/j.1520-8583.2007.00134.x>
- Peacocke, C. (1984). Colour concepts and colour experience. *Synthese*, 58(3), 365–381. <https://doi.org/10.1007/BF00485247>
- Roberts, P., Andow, J., & Schmidtke, K. (2014). Colour relationalism and the real deliverances of introspection. *Erkenntnis*, 79(5), 1173–1189. <https://doi.org/10.1007/s10670-014-9600-6>
- Roberts, P., & Schmidtke, K. A. (2019). Folk core beliefs about color. *Review of Philosophy and Psychology*, 10(4), 849–869. <https://doi.org/10.1007/s13164-019-00437-w>
- Russell, B. (1912). *The Problems of Philosophy*. Barnes & Noble.
- Russell, B. (2020). *Introduction to Mathematical Philosophy*. London: Methuen & Co Ltd.
- Strawson, P. F. (1974). Causation in perception. In *Freedom and Resentment and Other Essays*. Methuen (Reprinted by Routledge).
- Watkins, M. (2005). Seeing red, the metaphysics of colours without the physics. *Australasian Journal of Philosophy*, 83(1), 33–52. <https://doi.org/10.1080/00048400500043936>

Open Access

This article is distributed under the terms of the Creative Commons Attribution 4.0 International License (<https://creativecommons.org/licenses/by/4.0/>), which permits unrestricted use, distribution, and reproduction in any medium, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons license, and indicate if changes were made.

