

## COLOUR CONSTANCY AND RUSSELLIAN REPRESENTATIONALISM

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### **Introduction**

Representationalism, the view that phenomenal character supervenes on intentional content, has attracted a wide following in recent years. Representationalism can take various forms. Most representationalists have offered a form of reductive representationalism, according to which phenomenal character is itself intentional content of a certain sort.<sup>1</sup> Such views promise to reduce the ‘hard problem’ of consciousness—that of explaining how conscious experience could arise in a physical world—to the seemingly easier problem of naturalizing intentionality. But representationalism can also take non-reductive form, or can even advocate a reduction in the other direction, of intentionality to phenomenal character.<sup>2</sup>

Representationalisms can also vary according to what kind of content phenomenal content is taken to be. The vast majority of representationalists have adopted the view that phenomenal content is a kind of Russellian content.<sup>3</sup> It is this form of representationalism that I will be arguing against in the present paper.

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<sup>1</sup> See Tye (1995), Dretske (1995), Harman (1990), Lycan (1996), Clark (2000), Droegge (2003), and Jackson (2003).

<sup>2</sup> See Searle (1990), Horgan and Tienson (2002), Siewert (1998), and Chalmers (2004).

<sup>3</sup> See, for example, all of the representationalists cited in fn.1 above.

## **Phenomenal Character and Phenomenal Content**

The phenomenal character of an experience is what it is like to have that experience. For instance, consider two different visual experiences. One is the experience I have while looking at a lemon. The other is the experience I have while looking at a pink flamingo. The two experiences differ in many respects. They occur at different moments in time, and at different places. They cause me to be reminded of different things, or to behave in different ways. But more notably, they differ in phenomenal character. What it is like for me to look at the lemon differs from what it is like for me to look at a pink flamingo. The phenomenal characters of the experiences differ in at least two very important respects. They have different spatial phenomenology, and they have different colour phenomenology. It is the distinctive colour aspects of visual experience that will be the focus of the present paper.

The notion of 'phenomenal character' is notoriously difficult to define, but relatively easy to demonstrate by example. The notion of 'phenomenal content' is a more technical notion. Something has intentional content if it has conditions of satisfaction. Beliefs, desires, and other propositional attitudes are paradigmatic mental states with intentional content. My belief that there are still cookies in the cookie jar can be either true or false, depending on whether in fact there are any cookies in the cookie jar. My desire that the weather be nice this weekend can be satisfied or not, depending on how things turn out.

Perceptual experiences also have intentional content. My visual experience had while looking at a pink flamingo represents the world as being a particular way. The experience can be either veridical or nonveridical, depending on how the world actually

is. I might have an experience like this one while looking at a green flamingo, in which case the experience would be a misperception of colour. Or I might be hallucinating.

There seems to be an intimate connection between the phenomenal character of an experience and intentional content. According to representationalists, there is a kind of intentional content inherent to the phenomenology of experience. In virtue of an experience's having a certain phenomenal character, the world is presented to the subject as being a certain way. I will call this intentional content of experience 'phenomenal content'. Phenomenal content is intentional content such that, necessarily, if two experiences have the same phenomenal character then they have the same phenomenal content.

The distinction between phenomenal content and phenomenal character is neutral between two sorts of issues. One, it is neutral between views that say that phenomenal character is itself reducible to phenomenal content, those that say phenomenal content is instead reducible to phenomenal character, and non-reductive views. Second, it is neutral about the nature of phenomenal content. As I use the phrase 'phenomenal content', it is definitional for states that have phenomenal content that sameness of phenomenal character entails sameness of phenomenal content.<sup>4</sup> But there can be different views about the nature of this content. The dominant view in the literature is that phenomenal content is a kind of Russellian content. On these views, the phenomenal content of an experience is solely a matter of what properties or objects it represents. It follows from Russellianism about phenomenal content that two experiences with the same phenomenal character will attribute the same properties to their respective

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<sup>4</sup> It is of course a matter of dispute whether or not there is such a thing as phenomenal content, and to what extent. See Siewert (1998) and Horgan and Tienson (2002) for some arguments in favour of the existence of phenomenal content.

objects. Alternatively, one might adopt a Fregean theory of phenomenal content, according to which phenomenal content involves modes of presentations of represented properties.<sup>5</sup> Both views hold that phenomenal character and phenomenal content cannot vary independently. But Fregeanism can allow, while Russellianism cannot, for experiences with the same phenomenal character to represent different external properties.<sup>6</sup> In what follows I will argue that there are actual cases of such covariance, such that standard Russellianism (to be defined below) cannot be the right theory of phenomenal content. I will argue that standard Russellianism is unable to simultaneously give a proper account of the phenomenal content of colour experience and do justice to the phenomenology of colour experience. In particular, it cannot accommodate the phenomenon of colour constancy.

### **Russellian Representationalism**

According to Russellian theories of phenomenal content, phenomenal content is purely extensional, consisting solely in reference to objects or the attribution of properties. Given that sameness of phenomenal character entails sameness of phenomenal content, Russellian theories of phenomenal content are theories that accept the following:

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<sup>5</sup> See my [Author's work] and Chalmers (2004).

<sup>6</sup> It is not obligatory that a Fregean theory allow this. For example, a Fregean view could hold that sameness of mode of presentation entails sameness of represented property. But there are other possible Fregean views that allow for experiences involving the same mode of presentation to represent different properties. I develop a view like this in [reference omitted], according to which phenomenal content involves indexical modes of presentation. Two experiences with the same indexical modes of presentation can, in different contexts, determine different extensions.

For any phenomenal character  $\underline{r}$ , there is some property  $\underline{p}_r$  such that necessarily if an experience has phenomenal character  $\underline{r}$  then it attributes  $\underline{p}_r$ .

For instance, a Russellian might claim that all phenomenally red experiences attribute the property of redness to the object of perception.

With regard to colour experience, different versions of Russellianism can be categorized in terms of their positions on the following matters: 1) What properties  $\underline{p}_r$  colour experiences represent; 2) Whether colour experiences are ever veridical; and 3) What the relationship is between phenomenal character  $\underline{r}$  and the represented properties  $\underline{p}_r$ . For instance, naïve realism holds that colour experiences represent colours, that colour experiences can be veridical, and that the relationship between phenomenal character and the colours is one of constitution. The phenomenal character of an experience is at least partly constituted by being appropriately related to a colour. Projectivists, such as Boghossian and Velleman (1989), hold that colour experiences represent mental properties, that these properties are identical to the properties that determine phenomenal character, and that these properties are mistakenly projected onto external objects. Thus, projectivists of this sort hold that all colour experiences are nonveridical.

Some philosophers who have adopted a Russellian theory of phenomenal content are motivated by an attempt to reduce phenomenal character to a certain kind of intentional content. This includes externalist representationalists like Dretske (1995), Harman (1990), and Tye (1995, 2000). Reductive representationalists typically hold that

colour experiences represent physical colours, that those experiences can be veridical, and that phenomenal character consists in the representing of those properties.<sup>7</sup>

Shoemaker (1994, 2001) has adopted a similar but more moderate form of Russellianism. It differs from standard reductive representationalism in that the properties Shoemaker's theory says are represented by colour experiences are not physical colours, but rather dispositions to appear certain ways to certain individuals.

Another form of Russellianism, sometimes called 'primitivism', differs from standard representationalism in another respect. Colin McGinn (1997) has offered a theory of colour content which looks to be Russellian, but according to which colours are themselves irreducible properties of external objects.<sup>8</sup>

Let's call a theory of phenomenal content 'physical-property Russellianism' if it accepts the following:

For any phenomenal character  $\underline{r}$ , there is some physical property  $\underline{p}_r$  such that necessarily experiences with phenomenal character  $\underline{r}$  attribute  $\underline{p}_r$ .

The majority of Russellian theories of phenomenal content are versions of physical-property Russellianism.<sup>9</sup> For example, it is often held that colour experiences represent colours. Colours, in turn, are identified with some physical property, such as surface spectral reflectance properties. In discussing Russellian theories, I will have in mind physical-property Russellianism. In particular, I will be considering a specific kind

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<sup>7</sup> It is not clear that Tye (1995, 2000) identifies phenomenal character with the property of representing colours in a particular way. Instead, he often appears to identify phenomenal character with the properties represented. This is especially suggested by Tye (2002). See my [reference to author's work omitted].

<sup>8</sup> Johnston (unpublished) offers a similar view.

<sup>9</sup> Advocates include Byrne and Hilbert (1997), Dretske (1995), Harman (1990), Tye (1995).

of physical-property Russellianism, what we can call ‘mind-independent physical-property Russellianism’. Mind-independent physical-property Russellianism holds that

For any phenomenal character  $\underline{r}$ , there is some mind-independent physical property  $\underline{p}_r$  such that necessarily experiences with phenomenal character  $\underline{r}$  attribute  $\underline{p}_r$ .

For the sake of brevity, I will call mind-independent physical-property Russellianism ‘standard Russellianism’.<sup>10</sup> Here I use the term ‘mind-independent’ to refer to a property that does not essentially depend on any mental states or properties. I will call a property ‘mind-dependent’ if it does essentially depend on mental states or properties.<sup>11</sup> I mean to include in the notion of a mind-dependent property such things as dispositions to cause certain types of mental states. I have criticized elsewhere an alternate form of Russellianism that has been advocated by Shoemaker (1994, 2000, 2001)), according to which colour experiences represent certain mind-dependent properties of external objects.<sup>12</sup>

### **Colour constancy**

Consider the way that a ripe tomato looks at noon in full sun versus at five o’clock in the afternoon. The tomato, both at noon and in the late afternoon, will appear to be

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<sup>10</sup> This is a variation on Shoemaker’s (2003) use of the term ‘standard representationalism’ to refer to this type of view.

<sup>11</sup> This distinction does not assume that materialism is false. Even if materialism is true, there is presumably a distinction between those physical states that are also mental states and those physical states that are not mental. A mind-dependent property might, on such a view, be a mental property or a property that is constituted by relations to mental properties.

<sup>12</sup> [reference to author’s work omitted].

the same colour. This is so even though the lighting conditions might change between noon and five o'clock. One might view the tomato continuously during that time. Clouds will occasionally pass overhead, changing the amount and proportions of the spectrum of light that reaches the tomato and your eyes. As the sun sets, the atmosphere filters the light in different ways, changing the percentages of various wavelengths of light that strike the tomato and are then reflected from the tomato to the retina. Light from the sun as it sets is heavier on the red end of the spectrum than the more bluish light at midday. These changes in illumination are adjusted for by the visual system in such a way that the tomato will appear to be the same colour despite differences in the spectral distribution of the light reaching the eye. This ability of the visual system to extract information about relatively stable surface colour across variations in illumination is called 'colour constancy'.

But despite the fact that the tomato will look to be the same colour, the tomato nonetheless looks different at noon versus five o'clock.<sup>13</sup> If this isn't immediately obvious,

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<sup>13</sup> As an anonymous referee points out, this description of the case is somewhat idealized. Various adaptation mechanisms are involved in human colour constancy, and they operate over different amounts of time. The result is that after a sufficient amount of time has passed and these slow adaptation processes have run their course, the way something looks after a significant change in viewing conditions can sometimes be the same as the way it looked before the change. Such adaptation is imperfect however, and I think that despite adaptation, it is likely that a tomato viewed in the noon sun will look different than when viewed in the late afternoon. But the argument against Standard Russellianism below does not depend on this. The argument goes through even if we restrict ourselves to the many cases of colour constancy in which these slow adaptation mechanisms have no relevant effect, such as rapid changes in lighting conditions and differences in lighting within a single scene at a single time (including highlight and shadow).

Human colour vision is also not perfectly colour constant, and so there can also be changes in illumination that are significant enough that an object will not only look different after the change but will also look to be a different colour. But in less severe changes in viewing conditions, an object will come to look different without thereby looking to be a different colour. What is being noted here is that even when colour

consider what it is like to put on a pair of tinted sunglasses or to view an object first in sunlight and then under incandescent lighting. The visually presented scene changes in its appearance, but the objects you see do not appear to have changed colour. Rarely are objects evenly illuminated. The tomato one is viewing might have more light hitting it in some places than in others; some will be highlighted with light and others will be more in shadow. Correspondingly, the tomato will ‘look darker’ in some places than in others—the phenomenal redness that one experiences will vary in character across different portions of the tomato. Nonetheless, the tomato looks to be roughly the same colour across its entire surface.

The phenomenon of colour constancy has been studied extensively in the laboratory. The problem of colour constancy is usually defined, as in Hurlbert (1998), as the task of recovering ‘the invariant spectral reflectance properties of object surfaces from the image irradiance, in which reflectance is entangled with surface illumination.’ That is, from the image irradiance (the light reaching the eye from the object of perception) the visual system must generate a representation of invariant spectral reflectances. Given that image irradiance is determined by both these invariant properties and the varying surface illuminations, the task is certainly not computationally trivial.<sup>14</sup>

The fact that two surfaces can in some sense look to be the same colour, while in another sense present different colour appearances, is made evident from the everyday experiences of seeing objects under varying lighting conditions. It is also suggested by some of the research on colour constancy. Arend and Reeves (1986, 1991) presented subjects with computer-simulated scenes of two identical arrays of Munsell papers (a

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constancy mechanisms succeed, we need to distinguish two senses of ‘looks the same colour’.

<sup>14</sup> See for example Finlayson (2000) and Hurlbert (1998).

standardized set of coloured papers). In each trial, subjects were asked to match a paper from one array with another paper from a test array. The papers from the test array were viewed under different lighting conditions from the standard array. Observers were instructed to adjust one patch in the test array so that it matched the corresponding patch in the standard array.

Arend and Reeves found that different matching pairs were selected depending on how one described the task. Subjects were sometimes asked to match papers with the same brightness, hue, and saturation. Due to the different lighting conditions, subjects would match Munsell papers that ‘looked the same’ but that had different surface colour (papers that would not look the same when viewed under the same illumination). But subjects were also asked to select the test patch that ‘looks as if it were cut from the same piece of paper as the standard patch.’ In this condition, subjects exhibited colour constancy, selecting similar Munsell papers (papers that would present similar appearances under the same illumination). This second task requires the subject to match papers that look to have the same surface properties, as opposed to simply presenting the same visual appearance.

### **Standard Russellianism and Colour Constancy**

Philosophers, as well as psychologists and other vision researchers, frequently say about colour constancy that an object looks the same under an enormous variety of lighting conditions. Michael Tye, citing the research of Roger Shepard (1997), notes that ‘a bluish object lit only by reddish light of the setting sun continues to look blue, and a

reddish object illuminated by the bluish light of the sky continues to look red even though the light the objects reflect back to the eye is the same' (2000, p. 147).

There is a reading of this statement that strikes me as perfectly true. Objects do not appear to change in colour, despite changes in their illumination. But there is another important sense in which objects do appear to change colour when viewed under different lighting conditions. A bluish object lit only by the setting sun continues to look blue, but it does not look the same as when viewed in the morning sun, or under fluorescent lighting.

Recall that the standard Russellian holds the view that the phenomenal content of colour experience consists entirely in the attribution of specific colour properties. On this view, the phenomenal character of a colour experience is exhausted by the facts about what properties the experience represents the object of perception as having. The way something looks is solely a matter of the way it looks to be.

When one considers the phenomenon of colour constancy, it seems that such views must inevitably either fail to adequately capture the phenomenology of colour experience or fail to get the phenomenal content of colour experience right. Standard Russellianism entails that phenomenally identical colour experiences represent the very same physical colour properties. On Byrne and Hilbert's view, for example, two phenomenally identical red experiences will attribute the very same surface spectral reflectances to their respective objects. But given colour constancy, there can be cases in which two experiences share phenomenal character but do not represent the very same physical colours. Consider again the experience one might have while viewing a tomato in partial shade. To highlight the fact that we are considering a very specific red appearance, let's call the phenomenal character of the experience Jack has in a specific

portion of his visual field ‘phenomenal red<sub>27</sub>’. According to standard Russellianism, all phenomenal red<sub>27</sub> experiences attribute some specific physical colour property to their objects.<sup>15</sup> Let’s call the particular property phenomenal red<sub>27</sub> experiences are said to attribute ‘physical red<sub>27</sub>’.

The problem for standard Russellianism is that, due to colour constancy, there can be two experiences that share phenomenal character at a particular region of the visual field, which are both veridical, but in which the subject is viewing an object with different physical colour properties. For example, we imagined having a phenomenal red<sub>27</sub> experience while viewing a tomato in partial shade. According to standard Russellianism, all experiences with that phenomenal character represent some property physical red<sub>27</sub>. Now consider another experience that is phenomenal red<sub>27</sub>. One might have such an experience while looking at a portion of a dark red T-shirt under incandescent lighting. According to standard Russellianism, this experience attributes physical red<sub>27</sub> to the T-shirt. There does not seem to be any reason to deny that both experiences, that of the tomato in shade and the T-shirt in incandescent lighting, can be veridical. If both experiences are veridical, then according to standard Russellianism both the tomato and the T-shirt must be physical red<sub>27</sub>. But is there any physical property that both the tomato and the T-shirt possess, and that is plausibly represented by colour experiences?

Surface spectral reflectance properties will not fit the bill. The tomato and the T-shirt do not reflect the same percentages of light for each wavelength in the visual

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<sup>15</sup> The universal quantifier here stems from the fact that we are considering a theory of phenomenal content, according to which necessarily all experiences with the same phenomenal character have the same phenomenal content. The attribution of specific colour properties is due to the fact that we are considering a Russellian theory of phenomenal content.

spectrum. And there doesn't seem to be any other plausible candidate for a physical colour property that both the tomato and the T-shirt possess and that colour experiences represent. Intuitively, the experience of the tomato attributes a different property—a lighter shade of red—than does the experience of the dark red T-shirt.

The argument above can be formalized as follows. Consider the two experiences above had by Jack:

1. Jack's colour experience when viewing a particular region of the tomato is locally phenomenally identical to his experience when viewing a particular region of the T-shirt.
2. There is a local intentional difference between the two experiences.
3. If the two experiences are locally phenomenally the same but intentionally different, then standard Russellianism is false.
4. Therefore, standard Russellianism is false.

### **Denying Premise One**

The standard Russellian might respond to the argument by denying premise 1. But as mentioned earlier, there is experimental support for the intuitive idea that two objects can look the same with respect to colour phenomenology despite not looking to be the same colour. Subjects in the experiments by Arend and Reeves (1986, 1991) had no difficulty matching Munsell papers using this criterion. And we can find further support from looking at paintings or photographs. Consider looking at a group of trees. Some of the trees will be in shadow and will present a dark green appearance. We are familiar

with the idea that one could photograph or depict the tree in a painting in such a way that a portion of the photograph or painting will present a phenomenally identical colour appearance to the experience one has of the actual tree, despite being viewed under different lighting conditions.

The standard Russellian might object that in such cases there is phenomenal similarity, but not phenomenal identity. There is an aspect of sameness and an aspect of difference in the two experiences, but why think that this is sameness with respect to phenomenal character and a difference in represented properties? Instead, the standard Russellian might insist that, when Jack looks at the tomato and at the T-shirt, that there are aspects of the phenomenology that are the same and aspects that are different. Correspondingly, there are aspects of the intentional content of the experiences that are the same and aspects that are different.

The standard Russellian might further develop this suggestion about colour constancy by appealing to the richness of visual phenomenal content. The visual system represents objects as having stable surface colour properties through colour constancy mechanisms.<sup>16</sup> But the visual system does not discard the information about illumination and the spectral distribution of light reaching the eye. So the standard Russellian might insist that visual content is layered, consisting of a representation of illumination-invariant colour properties as well as representations of illumination and current spectral

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<sup>16</sup> A visual system that didn't adjust for changes in incident light wouldn't be very useful to a creature living in a world in which illumination changes (both in intensity and in the spectral distribution of light) rather frequently (passing clouds, walking under a tree, the rising and setting of the sun, etc.) Walsh and Kulikowski (1998) and Byrne and Hilbert (1997, vol. 2) contain several articles on the mechanisms of colour constancy.

distribution.<sup>17</sup>

Premise 1 of the colour constancy argument claims that Jack's local experience of the tomato was phenomenally identical to his local experience of the T-shirt. A layered Russellian theory of colour content provides a way of denying that premise. On this view, the two experiences might be phenomenally the same with respect to one layer of phenomenal content, such as the representation of the current spectral distribution of light that is reflected by the objects. But the two experiences will differ with respect to another aspect of colour experience, such as the representation of illumination-invariant colour.

Let's call the sense in which objects look 'the same colour' when they cause experiences that match in hue, saturation, and brightness sameness of 'sensory colour'. Let's call the sense of 'same colour' in which objects that appear to have the same surface colour properties look to be the same colour a sameness of 'surface colour'. Objects can match with respect to sensory colour and yet not look the same surface colour. And objects can match with respect to surface colour and yet not look the same sensory colour. Prima facie, experiences of objects with the same sensory colour have the same phenomenal character with respect to the colour aspects of experience. Objects that match with respect to surface colour are objects that appear to the subject to be the same physical colour. That is, sameness of surface colour seems to be sameness in what physical colour properties are attributed to the objects of experience.

Standard Russellianism cannot allow for attributed properties and phenomenal character to vary independently. The response in question to the above argument is to

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<sup>17</sup> Lycan (1996) has suggested that perceptual contents are layered in this sense in describing other features of visual experience.

hold that sensory colour is an aspect of colour phenomenology, but not exhaustive of colour phenomenology. Surface colour is also an aspect of colour phenomenology. Thus cases in which objects match with respect to one but not the other do not show that colour phenomenology and represented properties can covary.

But introspectively, it is straightforward that sameness of colour phenomenal character is sameness of sensory colour. When two items differ in sensory colour they differ *entirely* with respect to the vivid visual phenomenal features that are associated with our experiences of colour. The phenomenal colour appearance of a place in the visual field is exhaustively characterized by hue, saturation, and brightness (understood as features of visual experience, not as physical qualities of light). This is not only introspectively verifiable—it is the standard view in the literature on colour perception. It is in fact difficult to imagine a principled, rather than ad hoc, reason for holding that there is an aspect of *colour* phenomenology that is not hue, saturation, or brightness.

It might seem that two experiences will be phenomenally identical only when they match both with respect to colour and with respect to illumination, and so a layered Russellian view on which these are two distinct aspects of phenomenal character (and content) might seem attractive. But there is no phenomenally salient aspect of experience that corresponds to illumination except the experience of brightness. If one increases the intensity of the light in a room with a dimmer switch, everything will appear brighter. One will likely thereby represent the lighting conditions to be different from before. But this representational difference, as distinct from the representation of brightness, does not correspond to any additional aspect of the phenomenal character of colour experience. When objects of the same surface colour are viewed under the same illumination, they will indeed typically present the same colour appearance. This is because under such

conditions, objects of the same surface colour will also match with respect to sensory colour. But it is also possible for objects with different surface colours viewed under different illumination conditions to match with respect to sensory colour. The differences in surface properties can be compensated for by differences in the illumination, such that they will match with respect to hue, saturation, and brightness and present the same colour appearance.

In cases of colour constancy, when surface colour matches but sensory colour does not, there is no phenomenally conscious feature in the visual field that matches. The property that objects that ‘look like they were cut from the same sheet of paper’ share, even when viewed under different lighting conditions, is not the property that partially constitutes the phenomenal character of the colour experience. There is only an awareness that the two surfaces share a certain feature, one that is not phenomenally manifest. There appears to be no grounds for saying that there is a visual phenomenally shared feature. In fact, a plausible view about matches of surface colour when objects do not match in sensory colour is that the subject merely draws an inference about a shared property.<sup>18</sup> It seems to be consistent with the phenomenal character of such experiences that what strikes the subject as sameness of surface colour is simply a judgment about shared surface properties, or a judgment that the two objects would look the same with respect to *sensory colour* if the two objects were viewed under identical illumination conditions.<sup>19</sup> If sameness of surface colour was a sameness with regard to some aspect of

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<sup>18</sup> In the words of Brainard et al (1997, p. 2093), Bauml (in communication with Brainard) describes surface colour matches as ‘involving relational judgments; the observer proceeds (at least in part) by adjusting the match surface so that the colour relations between it and its surround are similar to those between the test surface and its surround’.

<sup>19</sup> Cohen (forthcoming) offers a view like this.

colour phenomenology, these views could be refuted solely by attending to the phenomenal character of such experiences. But this does not seem to be the case.

Recall that in the colour constancy experiments by Arend and Reeves (1986, 1991), subjects were asked to perform two sorts of colour matches. One of them was explicitly a match of hue, saturation, and brightness—what I am calling ‘sensory colour’.<sup>20</sup> The other was to match patches that ‘look like they were cut from the same sheet of paper’, that is, patches that have the same surface colour. The present suggestion on behalf of standard Russellianism requires that we interpret these experiments in a different way than I have suggested. At a minimum, the standard Russellian must deny that when subjects matched items according to sensory colour they were matching according to phenomenally identical colour experiences. The standard Russellian might, for example, hold that such matches are matches of one aspect of colour phenomenology, but that matches of surface colour are matches with respect to another aspect of colour phenomenology.

But given that sensory colour exhausts the phenomenal character of colour experience, the finding by Arend and Reeves that two coloured papers can match with respect to sensory colour and fail to match with respect to surface colour is significant. Their experiments do not merely show that subjects can make two interesting sorts of judgments. Nor is the dissociation of the two matching tasks compatible with the view that subjects are distinguishing between two aspects of phenomenal character. Matches of sensory colour, being matches of hue, saturation, and brightness, are judgments of identical phenomenal character. And their results suggest that the type of scenario

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<sup>20</sup> Arend and Reeves (1991) refer to this as ‘perceptually unasserted colour’. Since standard Russellians hold the view that these properties are attributed to the external objects of perception, I have chosen a more neutral terminology.

needed by Premise 1 of the argument is an ordinary one, in which two objects that have different surface colour are perceived under different illumination conditions and thus result in phenomenally identical colour experiences.<sup>21</sup>

It might be thought that two experiences have the same phenomenal character when they cannot be discriminated from one another.<sup>22</sup> And if it is granted that two experiences with the same sensory colour can represent their objects as having different surface colours, and this fact is introspectively available to the subject, then they *are* discriminable. Therefore, it could be argued that sensory colour does not exhaust phenomenal character. But I reject the suggested principle, at least without further

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<sup>21</sup> That subjects can reliably perform these two distinct tasks has been confirmed by Bauml (1999) and Kuriki and Uchikawa (1996). As an anonymous referee points out, Delahunt and Brainard (2004) did not find a strong instructional effect when subjects were asked to perform the two types of matches (see their Appendix B). But I do not think that this finding by Delahunt and Brainard undermines the use of asymmetric matching experiments by Arend and Reeves for my purposes here. First, Delahunt and Brainard conclude that the type of instructions used (surface match versus appearance match) in their experiments had a ‘small but consistent effect on the levels of constancy’ (p. 74). And as they note, their experiments studied colour constancy across changes in scenes over time, rather than simultaneous constancy. In their experiments, subjects adapted for one minute to changes in the illumination of a scene. After that adaptation, the subjects adjusted the patches until they appeared achromatic. As noted earlier, there are slow-adaptation mechanisms that result in constancy at the level of colour appearance over gradual changes in illumination. Thus, the best explanation for the smaller instructional effect in Delahunt and Brainard (2004) is that in their experiments, unlike the simultaneous matching experiments of Arend and Reeves, there was greater constancy of colour appearance, diminishing the size of the difference between constancy of appearance match and constancy of surface match. This is of no help to the standard Russellian. There was still a small but significant difference between appearance constancy and surface constancy. And the conditions used by Arend and Reeves are more relevant to a large variety of ordinary instances of colour constancy in which slow adaptation mechanisms can have no effect, such as experiences of highlight and shadow and of rapid changes in illumination. For just one example of the latter, consider one’s experience while walking through a forest, in which the variations in shade provided by the trees and variations in surface orientation will result both in differences in illumination within a scene at a single time and in rapid dynamic differences in illumination as one walks underneath.

<sup>22</sup> An anonymous referee raised this concern.

qualifications. One can have phenomenally identical colour experiences on two separate occasions. Those experiences will be discriminable from each other due to their separation in time. One might experience a square and a circle that are precisely the same colour and under the same illumination conditions. The experiences will be discriminable in virtue of a difference in the spatial aspects of the experiences. But they will be identical in the colour aspect of phenomenal character. Similarly, I accept that two phenomenally identical local colour experiences can be discriminable from each other by their attributing different surface colours. To assume that discriminations on the basis of extensional content entail a difference in phenomenal character is to beg the question in favour of Russellian Representationalism. The qualified version of the principle that might be acceptable is that two experiences have the same phenomenal character when they cannot be discriminated from one another on the basis of their phenomenal character. This principle is, of course, not very useful for our purposes. I have suggested here that we appeal to our own phenomenology and to the assumptions made by colour scientists, which supports the view that two colour experiences have the same phenomenal character when they are identical in hue, saturation, and brightness.

### **Denying Premise Two**

The standard Russellian might instead question premise 2. She might do so in two ways. One response would be to insist that one of the colour experiences is illusory. But the consequences of this view are highly counterintuitive. Both of the experiences have phenomenal characters that are typical for the subject when viewing objects with

those particular physical properties under those particular lighting conditions. To say that one of them is an illusory experience would entail that a large number, perhaps the majority, of our colour experiences are illusory.

A further problem for this view comes from the difficulty of identifying some privileged conditions of illumination under which objects appear to have the (determinate) colours they actually have. All other lighting conditions would be conditions in which colour perception is mistaken. But the pairs of experiences in question, those that are phenomenally the same but represent different colours, are perfectly ordinary experiences. There does not seem to be any reasonable basis for saying that one of each pair is veridical whereas the other is illusory. The best I think such a view can say is that colour experiences are veridical when viewed under midday sun on a cloudless day. But this would entail that all colour experiences had in the reddish light of the setting sun are misperceptions of colour. Most colour experiences had indoors in artificial lighting would also count as misperceptions on this proposal. And those unfortunate enough to live in Seattle or London rarely see the true colours of things. Different regions of the planet have different levels of water vapour and particulate matter in their immediate atmospheres, which filter the light differently. Does one have to view an object in Tucson or in Miami in order to accurately perceive colour? The question strikes me as absurd.

Byrne and Hilbert (2003) have recently embraced the conclusion that there is massive error in colour perception. In light of variation in normal colour perception (such as different choices for unique hues and variations in colour matching both between subjects and within subjects), Byrne and Hilbert accept that there is widespread misperception of the determinate colours. But they argue that this is not so

counterintuitive, since it does not entail that there is massive error with regard to the determinable colours of objects. For example, they allow that there could be massive error with respect to what objects are unique green. Nonetheless, most normal subjects veridically perceive green objects as green. Similarly, Byrne and Hilbert could allow that, in the case of the tomato and the red T-shirt, one or both experiences are misperceptions at the finest level of grain (determinate colour). At a coarser level, both experiences veridically represent redness. Properly accommodating colour constancy thus does not require that one hold that phenomenally identical colour experiences can attribute distinct colour properties.

With regard to identifying the conditions under which objects have the determinate colours they appear to have, Byrne and Hilbert (2003) acknowledge that we may have no independent grounds for settling the matter. They leave open the possibility that we might have no good reason to believe that an object is unique green, and in general, they allow that there may be unknowable colour facts.<sup>23</sup> But the problem with regard to colour constancy (as well as the other cases of variation discussed by Byrne and Hilbert) is not simply that we have no good reason to privilege a particular viewing condition as the one under which objects have the determinate colours they appear to have. Rather, it seems that one perceptual circumstance being privileged over another would be in principle arbitrary.<sup>24</sup>

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<sup>23</sup> fn. 50

<sup>24</sup> It will do no good to respond to this problem by holding that we are always wrong about determinate colour (thus eliminating the need for there to even be privileged viewing conditions). If we are often accurate with respect to determinable colour, then objects must have fully determinate colours. And if that is correct, then some of us at least some of the time surely do, or at least could, veridically represent the determinate colours. And so there must be some particular viewing conditions under which veridical representation would occur.

A different way of denying premise 2 is to identify some type of property that colour experiences might plausibly represent and that the tomato and the T-shirt might both possess. The dominant view about colour content among standard Russellians is the view that colour experiences represent physical colours, which in turn are identified with illumination-independent and mind-independent properties of external objects. Let's call these views 'illumination-invariant Russellianism'.<sup>25</sup> One move in response to the colour constancy argument is to adopt an 'illumination-variant' version of Russellianism. The mind-independent property that objects that phenomenally appear the same seem to have in common is the spectral power distribution of the reflected light. If colour experiences represent these illumination-variant properties, then neither the experience of the T-shirt nor the experience of the tomato need be a misperception.

When I describe a property as 'illumination-variant', I do not have in mind mind-dependent or subjective properties.<sup>26</sup> Instead, illumination-variant Russellianism is the view that colour experiences represent objects as having mind-independent properties that objects have. But unlike illumination-invariant theories, illumination-variant theories hold that these properties are not stable properties of objects but instead properties that vary under different illumination conditions. What wavelengths of light an object reflects depends not only on its stable surface properties but on the nature of light that strikes it.

Illumination-variant Russellianism accommodates the facts about phenomenal character, but at the cost of failing to accommodate many of our intuitions about colour

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<sup>25</sup> The views of Tye and Byrne and Hilbert mentioned above are representative of these views. Besides those views, Russellian views that identify colours with the objective grounds of dispositions to appear certain ways to certain observers would qualify as a version illumination-invariant Russellianism. For instance, a Russellian might adopt Jackson and Pargetter's (1987) theory of colour.

<sup>26</sup> I consider those sorts of views, and especially the one advocated by Sydney Shoemaker (1994, 2001), in my [reference to author's work omitted].

and the content of colour experience, including some of the central motivations for Russellian Representationalism. According to illumination-variant Russellianism, the experiences had while viewing an object under varying illumination conditions, if all veridical, will differ in phenomenal content. But as noted earlier in introducing the phenomenon of colour constancy, objects do not appear to change in colour across illumination conditions. And if it is denied that colour experiences represent colours, rather than some other properties, it remains that there is an important sense in which objects do not appear to change despite changes in phenomenal colour appearances.

The illumination-variant Russellian will have to account for the sense in which objects appear to remain the same across changes in illumination that does not involve shared phenomenal content. Two possibilities come to mind. On one view, phenomenal colour content is accompanied by, or gives rise to an inference involving the representation of illumination-independent properties. Perhaps the phenomenal representation of illumination-variant properties, plus the representation of lighting conditions, gives rise to an additional representation of illumination-independent surface properties. These additional aspects of perceptual content would, on this view, be non-phenomenal representations.

Alternately, the illumination-variant Russellian might hold that objects are also represented (non-phenomenally) as having dispositions to appear certain ways under various lighting conditions. On this suggestion, one does not represent an illumination-independent property at all. Rather, the experience of a red object under two different lighting conditions gives rise to, in both cases, a representation of how the object would look under other lighting conditions (or perhaps under some particular canonical lighting

condition).<sup>27</sup>

Though I ultimately want to argue that neither illumination-invariant Russellianism nor illumination-variant Russellianism provides a satisfactory account of phenomenal colour content, it is worth pausing to note the significance of the argument so far. Most advocates of representationalism in general have endorsed illumination-invariant Russellianism about colour content.<sup>28</sup> That illumination-variant Russellianism is the only viable form of Russellianism would be an important conclusion in its own right.

The dominance of illumination-invariant Russellianism is not, however, simply due to a failure to consider Russellian alternatives. Illumination-variant Russellianism conflicts with strongly held intuitions about colour and colour experience. Common sense tells us that colour experiences represent, in the first instance, colours. And common sense holds that colours are properties that objects retain across changes in illumination and other viewing conditions.

We simply do not say of objects that they change in colour under different lighting conditions. Nor is it proper to say of visual experiences involving colour constancy that there is a change in the colour an object appears to have. In describing the experience of highlight and shadow, it would not be correct to say that an object is a different colour in the shadowed or highlighted areas. The object looks different in those areas, but does not look to be a different colour in those areas. And whatever colours are, it would be a

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<sup>27</sup> Jonathan Cohen (forthcoming) offers a view about colour and colour constancy that resembles this proposal.

<sup>28</sup> This would include all of the representationalists previously cited. Those who have abandoned illumination-invariant Russellianism (such as Shoemaker 2003) have typically taken colours, or the properties represented by colour experiences, to be mind-dependent properties.

violation of our ordinary concept of colour to say that an object changes colour when a passing object casts it in shadow. The illumination-variant Russellian nonetheless insists that when colour appearances change, there is a change in what property the experience represents. We should conclude then that on this view, the phenomenal content of colour experiences does not represent colours. But what could colours be, and what would explain our intense interest in them, if they are not the properties that our colour experiences represent?

A phenomenon closely related to colour constancy also poses a problem for the illumination-variant view. Objects that are reflecting light with the same spectral power distribution can nonetheless present a different colour appearance depending on the colour of the surrounding area.<sup>29</sup> Such simultaneous contrast effects present a challenge to the illumination-variant view (and illumination-invariant Russellianism) that is analogous to the argument above concerning colour constancy. Consider two yellow X-shaped characters on a surface. Both have the same surface properties and are viewed in the same light, such that both are reflecting light with the same spectral power distribution. One of them is against a yellow background of a different shade and the other is against a grey background, such that, due to the contrast effect, the two X-shaped characters present a different colour appearance. The character against the grey background looks a darker shade of yellow than the character against the yellow background.

As in the case of colour constancy, there does not seem to be any principled grounds for saying that one of the X-shaped characters presents an illusory colour appearance. All colours are normally seen against a background of various surrounding

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<sup>29</sup> Wyszecki (1986) provides a review of colour contrast effects.

colours. There does not seem to be any reasonable basis for choosing one such surround over another as the conditions under which objects have the colours they appear to have. Contrast effects can be eliminated by viewing a coloured region through a reduction tube. But as Cohen (2001) points out, treating only those circumstances as conducive to veridical colour perception has two very troubling consequences. It would follow that the vast majority of ordinary viewing conditions are ones in which normal perceivers are misperceivers of colour. But even worse, it would follow that nothing can have contrast colours like brown, olive, pure white, and pure black.

We ought then to hold that the two distinct colour appearances had when viewing the two X-shaped characters are both veridical. But if we say this, then the suggestion that colour experiences represent an illumination-variant property, such as spectral power distributions, can be shown to be mistaken. For consider a third X-shaped character against a white background. This character has different surface properties and reflects light of a different spectral power distribution than the first two characters. But due to the contrast effects, it presents a colour appearance that is precisely the same as one of the first two characters. For example, it might be a darker shade of yellow to match the character set against a grey background. An experience of this character should also count as veridical. But the two phenomenally identical colour experiences of the two characters cannot both represent the same spectral power distribution, since the two characters are reflecting light with different spectral power distributions. Thus, the phenomenal content of colour experiences cannot consist solely in the attribution of the spectral power distributions of reflected light.

At this point, if one is not to abandon Standard Russellianism, the likely move is to hold that colour experiences represent properties of objects that vary both with

changes in illumination conditions and with changes in the surround. The most likely candidate is the property of reflecting light with a particular spectral power distribution under particular viewing conditions (including properties of the surround). But the resulting view is strained at best. Due to colour contrast effects, an experience of a determinate phenomenal colour can be veridically caused by a large disjunction of spectral power distributions depending on the properties of the surround. Phenomenal colour properties will thus be disjunctive properties on this view: SPD<sub>12</sub> in context C<sub>3</sub> or SPD<sub>59</sub> in context C<sub>93</sub> or (...). Whether this can be reconciled with the phenomenology of experience is questionable. What seems more plausible is that phenomenal colour properties have a disjunction of *causes* (even when restricting ourselves to veridical perceptions). One wants to know *why* these disparate properties can, in veridical perception, give rise to experiences with the same phenomenal character. What unites these properties, it seems, is their effects on perceivers like us rather than any feature they have in common in themselves. These considerations push us to abandon Standard Russellianism in favour either of mind-dependent Russellianism or a non-Russellian view.

### **Denying Premise Three**

The argument from colour constancy is based on the possibility of there being two experiences that share phenomenal character with respect to a local portion of the visual field. The argument proceeds by noting that those two local experiences, despite being phenomenally identical, differ in intentional content. But the standard Russellian might resist the argument by denying premise three: If the two experiences are locally

phenomenally the same but locally intentionally different, then standard Russellianism is false. The colour constancy argument as it has been formulated is an argument against a localist rather than holistic theory of phenomenal content. It assumes that what colour a particular region of the visual field represents is determined independently of the phenomenal character of the rest of the visual field. But it might be suggested that phenomenal colour content is Russellian but that it is holistically determined. That is, what particular property a local phenomenal colour property represents might depend on other phenomenal features of the experience.

It does in fact seem to be the case that if two experiences are globally the same in phenomenal character, there will be no difference in the intentional content of the colour experiences. But a holistic theory of phenomenal colour content is not available to the standard Russellian who is motivated by the transparency thesis. That thesis maintains that for any phenomenal colour property that we can identify through introspection on a visual experience, that property is a property that is represented as belonging to the external object of perception. Transparency, insofar as it is plausible, is an observation about the local aspects of visual experience.

Tye (1992) describes transparency as follows:

Standing on the beach in Santa Barbara a couple of summers ago on a bright sunny day, I found myself transfixed by the intense blue of the Pacific Ocean. .... [W]hat I found so pleasing in the above instance, what I was focusing on, as it were, were a certain shade and intensity of the colour blue. I experienced blue as a property of the ocean not as a property of my experience. ...When one tries to focus on it [the sensation

of blue] in introspection one cannot help but see right through it so that what one actually ends up attending to is the real colour blue.<sup>30</sup>

Tye claims that the phenomenologically salient blueness that he experienced was experienced as being a property of the ocean (and not as a property of his experience). His visual experience had truth conditions such that, for the experience to be veridical, that very property which was available to him in introspection is instantiated by the Pacific Ocean.

All Russellian theories of phenomenal content that I am aware of—and all such theories that I think have any prima facie plausibility—are motivated by the transparency intuition. The reason for this, I would suggest, is that there needs to be an explanation for the relationship between phenomenal character and phenomenal content. In particular, an adequate theory should make sense of why phenomenal content metaphysically supervenes on phenomenal character. The transparency intuition reflects a view about phenomenology that immediately leads to a Russellian theory of phenomenal content and that explains the relationship between the two. Phenomenal character itself involves the representation of specific properties. A Russellian theory of phenomenal content that does not endorse transparency makes it mysterious why an experience with a certain phenomenal character would represent some particular property rather than another.<sup>31</sup>

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<sup>30</sup> Moore (1903) offers an earlier, and perhaps slightly different, version of the transparency thesis.

<sup>31</sup> A Russellian theory of phenomenal content that is not motivated by transparency should not be mistaken with a ‘natural sign’ theory of content for conscious experiences, in which the relationship between phenomenal character and representational content is

Consider again Tye's observation about the blueness of the Pacific Ocean. It seems that, while viewing the ocean, one can isolate a small bluish portion of one's visual field. And it would do the Russellian no good, in motivating that view, to deny that the blueness in that portion of the visual field is not a property that one experiences as belonging to the ocean. If two experiences can share local phenomenal character with respect to colour, then transparency entails that those two experiences represent the very same property as belonging to their respective objects. And that is to say that premise three of the argument is true.

### **Conclusion**

The phenomenon of colour constancy shows that illumination-independent Russellian theories of phenomenal colour content do not have the resources to correctly explain the phenomenal character of colour experience. On those views, experiences with the same phenomenal character attribute the very same particular illumination-independent colour property. But colour constancy shows that phenomenally identical experiences can both be veridical despite their objects having different illumination-independent colours.

Colour constancy suggests that Russellianism is plausible only if one adopts an illumination-variant theory of the properties represented by colour experiences. But these views conflict with strongly held intuitions about colours and the content of colour experiences. And simultaneous colour contrast effects pose a challenge for an

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arbitrary rather than necessary. It is a defining feature of phenomenal content that the relationship is one of metaphysical necessity.

illumination-variant theory that is analogous to the one posed by colour constancy for illumination-invariant theories. The considerations that have been offered here suggest that if representationalism is to be tenable it must take some other view about the nature of phenomenal content.<sup>32</sup>

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<sup>32</sup> [Acknowledgments omitted to facilitate blind review]

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