

*Tye on Color and the Explanatory Gap*\*

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It will not have escaped notice that the defendant in this afternoon's trial has declined to take the stand. (Tye had a prior commitment to the Southern Society for Philosophy and Psychology.) It is an indication of the importance and interest of *Consciousness, Color, and Content* that we were all keen to press ahead with this symposium, despite Tye's absence. If Tye had been present, I would have reprised part of a paper on Tye's PANIC theory of consciousness, with which I have some serious disagreements.<sup>1</sup> But because a three-way prosecution of Tye's position, with no opportunity for reply, would not make for a productive symposium, the APA has appointed me as Tye's attorney. Fortunately, I have a good deal of sympathy with Tye's position on color, and at least some sympathy with his position on the explanatory gap, so I am one of those unusual attorneys who largely believes his client's protestations of innocence. But be warned: appointed attorneys are usually not of the caliber of David Boies or Barry Scheck. It should not be taken to reflect badly on my client if, through drunkenness or incompetence, I do not manage to mount the best defense.

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\* Many thanks to David Hilbert for discussion.

<sup>1</sup> See the forthcoming *A Field Guide to the Philosophy of Mind* symposium on Tye's book: < <http://host.uniroma3.it/progetti/kant/field/tyesymp.htm>>.

Tye's book covers a great deal of ground. We get a theory of consciousness, a theory of color, an (intentionalist) theory of the relation between content and phenomenal character, a psychosemantics, a rebuttal to Jackson's knowledge argument, a diagnosis of the explanatory gap, and more besides.

Although the theories expounded in *Consciousness, Color and Content* are interrelated (more of this later), to a very large extent the reader may pick and choose. For example, one might reject Tye's theory of color, while endorsing his account of consciousness. Or one might reject Tye's diagnosis of the explanatory gap, while endorsing his intentionalism about phenomenal character. So a substantial portion of Tye's overall theory might survive, even if Hardin's and Levine's criticisms are accepted.

Hardin and Levine focus on the topics to which they have each made such a significant contribution. Hardin introduced many philosophers to color science, and has devised a number of exceptionally interesting and ingenious arguments for his own preferred position of color eliminativism (or irrealism). And we owe to Levine one of the earliest and most compelling formulations of the acute problem of explaining the phenomenal character of experience in physical terms, as well as its name—the “explanatory gap”.

### ***I. Color***

I shall begin with Hardin. In evaluating the objections to Tye that Hardin discusses, it is important to distinguish two views. The first is color realism (Hardin's “first principle”): physical objects are colored. The second is the stronger claim that the colors are certain sorts of physical properties, specifically types of surface spectral reflectances—*reflectance physicalism*, I'll call it. Tye—along with Hilbert, Armstrong,

Dretske, and myself—holds the stronger claim (and so also the weaker one). Some of the objections are directed against color realism (and so also against reflectance physicalism), while others are just directed against reflectance physicalism.

The first two objections that Hardin mentions are taken from Tooby and Cosmides' Foreword to Baron-Cohen's *Mindblindness* (MIT Press, 1995), although the objections are not, of course, original with Tooby and Cosmides. (It is best to think of these two objections as targeted specifically against reflectance physicalism.) The first objection starts from the observation that “we sometimes see physically identical objects or spectral arrays as having different colors” and the second starts from the phenomenon of metamerism: “we routinely see physically different spectral arrays as having the same color”. Tooby and Cosmides conclude that “far from being a physical property of objects, color is a mental property—a useful invention that specialized circuitry computes in our minds and then projects onto our percepts of physically colorless objects”.<sup>2</sup>

Take the second objection first. It is clear from the context that Tooby and Cosmides mean something quite specific by ‘physically different’; if they didn’t, the argument would be hopeless. After all, in a straightforward sense of ‘physically different’, we routinely see physically different objects (say an orange and a baseball) as having the same determinate shape, but that could hardly show that shape was a “mental property”. Tooby and Cosmides’ point is that objects that have *different spectral reflectances* can look to have the same determinate color: the phenomenon of *metamerism*. So, if colors are identified with reflectances, we will rarely see objects as

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<sup>2</sup> See CCC, 150. The quotations are from *Mindblindness*, xi.

having the colors they do have. Since such a version of color realism is quite unattractive, color eliminativism must be true.

Now Tye doesn't officially respond to the second objection, as I have just stated it. Instead, he takes the second objection to revolve around *color constancy*, not metamerism. As Hardin has explained, the phenomenon of (approximate) color constancy is that the apparent colors of objects do not significantly change over a wide range of illumination, and a consequent wide range of light reaching the eye. Tye's response to this, as Hardin mentions, is to say that "the color a surface has is not one and the same as the wavelength of the light it reflects under any particular illumination" (CCC, 150). The phenomenon of color constancy thus provides one of Tye's motivations for selecting reflectances (which are illumination-independent properties) as the most plausible physical candidates to be identified with the colors.

As I said, Tye doesn't actually respond to the second objection, as I (and Hardin) understand it. But from what he says elsewhere it is clear how he ought to respond. Forget about metamerism, which concerns the highly determinate colors, and consider what a reflectance physicalist ought to say about the determinable colors—red, yellow, green, and so on. The surface spectral reflectance of an object is the proportion of incident light, at each wavelength in the visible spectrum, the object would reflect. So, if object *a* would reflect 35% of the incident light at 700nm, and object *b* would reflect 36%, then *a* and *b* differ in reflectance. Reflectances are therefore very discriminating properties: tomatoes, strawberries and raspberries all differ in reflectance. Hence, without appeal to metamerism, we can see that reflectances are plainly unsuited to be identified with the relatively *undiscriminating* determinables red, yellow, green, and so on. But the

solution for the reflectance physicalist is obvious: the determinables red, yellow, green are to be identified, not with specific reflectances, but with reflectance *types*. And that—as I mentioned at the beginning—is exactly Tye’s proposal. These reflectance types are, he says (borrowing some useful terminology from Hilbert) *anthropocentric*, but are perfectly “objective” physical properties for all that.

Given that the move to reflectance types is required to deal with the color determinables, the problem for the determinates raised by the phenomenon of metamerism does not create any additional difficulty. It would be natural for Tye to hold that the determinate shades, like the determinable colors, are types of reflectances, and hence that two objects can have the same determinate shade of color, despite having different reflectances. If Tye’s account of the determinable colors as types of reflectances is acceptable, presumably a similar account of the determinate shades is likewise acceptable; and if it is, the phenomenon of metamerism poses no threat.

Hardin adds a twist, though. He notes that:

Given any particular illuminant, and any particular observer, one can always find a pair of physical samples that will match for that observer under that illuminant, yet fail to match for that observer under other illuminants...So shouldn’t the color realist not only claim that there are viewing conditions that are veridical, but be able to specify which ones are veridical, or at least how we could in principle recognize such conditions when we encounter them? (5)<sup>3</sup>

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<sup>3</sup> “A spectral reflectance doth not a color make” (MS).

Notice that *this* point does not rely at all on the details of Tye's view, in particular that colors are types of reflectances. It is a challenge to *any* realist account of color—physicalist or not—that holds that objects do not typically change color through changes in illumination. Such accounts must admit that sometimes the apparent color of an object is not its real color: in some viewing conditions one's color experiences are veridical, but in others they are not.

There is, of course, an unhelpful way in which the color realist can specify which viewing conditions are veridical. If one is looking at a ripe tomato, say, in North Daylight, at distance of three feet, etc., and it looks red, then this viewing condition is veridical just in case the tomato is red. But Hardin wants more. He wants, I think, a specification of veridical viewing conditions that would provide an "independent test" of whether a certain color experience was veridical. The tomato *looks* vermilion, say, in a certain viewing condition, but is it really vermilion, or even red at all? (After all, it won't appear red under some illuminants, and won't appear vermilion under an even wider selection of illuminants.) Hardin seems to be insisting that the color realist supply *another* reason for believing that the tomato is red. Let us call this requirement *the demand for an independent test*: it crops up a number of times throughout Hardin's paper, and because of that I will postpone discussion of it until the end.

Now to the first of Tooby and Cosmides' objections. The apparent color of an object varies with its surround: the phenomenon of simultaneous contrast. For example (speaking with the color realist for convenience), a gray object will look lighter against a black background than against a white one (as illustrated in figure 7.1 of *Consciousness*,

*Color, and Content*), and a bluish-green object will look more bluish against a green background (as illustrated in plate 2 of Hardin's *Color for Philosophers*). Again, the conclusion that Tooby and Cosmides draw from these facts is that external objects are not colored.

As Hardin mentions, Tye considers the response that the color of an object *does* depend on its surround. On this view, placing a bluish-green object against a green background will change the object's color, making it more bluish. Although a physicalist about color could endorse this response, a *reflectance* physicalist could not, because the reflectance of an object does not depend on its surround. Tye rejects a relational account on the ground that "intuitively...our ordinary experiences of color place (many) object colors on the surfaces of objects independently of what is going on elsewhere in the surroundings. In this respect, color seems to me like shape...To take a relational view of color is to repudiate this commonsense fact" (CCC, 153).

Tye's official response (again as Hardin mentions) is to look for other partners in crime. There are simultaneous contrast effects for shape, as the philosopher's favorite example of the Müller-Lyer illusion illustrates, and Tye gives some other examples. This doesn't show that shape is a mental property, or that the shape of an object is relative to its surround. Rather, it shows that sometimes an object's surround can prevent us from seeing the shape it actually has. For example, although often square objects will look square, sometimes they don't, for example when a square is superimposed on one side of a pattern of radiating spokes it looks wider at one end than at the other.

Here is it helpful to draw a distinction between *perceptible properties*, on the one hand, and *conditions necessary for their perception*, on the other.<sup>4</sup> Plainly the two should not be confused, any more than the pressure of one's bicycle tires should be confused with the conditions necessary for detecting the pressure (the presence of a well-functioning pressure gauge, among other things). The conditions necessary for the (veridical) perception of shape include facts about the surround, and also facts about the perceiver. Plainly this does not show that shape itself—the property perceived—is in any way relative to the surround, or relative to the perceiver, or that no external object has a shape. Similarly, the conditions necessary for the perception of color include facts about the surround, and also facts about “mechanisms within the brain of the viewer” (Hardin, 7). But, Tye is saying, this doesn't show that color is relative to the surround, or to the perceiver, or that no external object has a color.

That reply seems to me to be effective in fending off Tooby and Cosmides' first objection. But Hardin adds to the argument by repeating his demand for an independent test (remember discussion of this is being deferred):

But is color contrast really like those illusions in which straight lines appear bent?

One obvious difference is that we have ways of determining that illusions of shape are really illusions. For example, in the Müller-Lyer illusion one can use a ruler to measure the lengths of the lines in question. By what comparable means

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<sup>4</sup> See Byrne and Hilbert, “Color Realism and Color Science”, sect. 1.3.3.,

<<http://mit.edu/byrne/www/ColorRealism.html>>.



can we determine that the color change in simultaneous contrast is apparent rather than real? (7)

Unfortunately, we haven't quite finished with Tye's response to the contrast objection. Tye mentions that successive contrast (e.g. experiencing a red afterimage after looking at a green object) is importantly similar to simultaneous contrast (the opponent mechanisms play a major role in both). He gives some plausible examples of illusions produced by simultaneous contrast, and then faces an objection:

Perhaps it will be objected that the account just offered of simultaneous contrast [as involving illusions] threatens to generate a selective realism about colors. For white, gray, black, and brown, it is often said, are pure contrast colors. If contrast effects involve color illusions, then nothing in the external environment has any of these colors. (CCC, 156)

A pure contrast color is one that cannot be seen in isolation from other colors. In order to see something as deep black, for example, lighter objects need to be present in the scene before the eyes. Tye seems to concede that if black, say, is a pure contrast color, then either all experiences as of black objects are illusory, or else whether an object is black

depends on its surround. At any rate, he spends some time arguing that black isn't a pure contrast color.<sup>5</sup>

In response, Hardin complains that "Black and brown are, *pace* Tye, pure contrast colors, so to treat all contrast colors as illusory is to eliminate whole color categories" (9), and notes that the damage would be even more widespread, eliminating dark and light colors like navy blue and olive green.

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<sup>5</sup> "Consider the case in which one is in a totally dark room. As [Irving] Rock notes, this "can be considered to be a special case of a Ganzfeld." However, he insists, "a dark room looks dark, not black" [*The Logic of Perception*, 503].

This view seems to me stipulative. After all, in ordinary life, we certainly say things like "It's pitch black in here" with respect to totally dark rooms, presumably because that is the way such rooms look to us. Let us, then, distinguish between black and BLACK. In the dark room, one experiences black but not BLACK. Something is BLACK, let us say, just in case it is black and it is darker than its surroundings. BLACK, thus, is a pure contrast color, but black is not. Even so, irrationalism about BLACK does not follow. For something can look BLACK in a given setting and genuinely be BLACK (so long as it is black and darker than its surroundings)...

On this proposal, BLACK is a compound, partly relational property. One sees the BLACKNESS of an object indirectly by seeing its blackness and seeing its relative darkness with respect to its surroundings. But black is not relational, or at least no compelling reason has yet been given for supposing that it is." (CCC, 157)

However, it seems to me that Tye's attempt to deny that black is a pure contrast color is entirely unnecessary. Tye already gave a perfectly adequate reply to the contrast objection by comparing color to shape. Once we draw the distinction between perceptible properties and conditions necessary for their perception, there is no need for the color realist to deny that black is a pure contrast color, or to affirm that black is relational. Black, as Hardin says, is a pure contrast color: an object can only appear black against a lighter surround. However, this fact about the conditions necessary for the perception of black does not provide any support for the view that black is relational or that nothing has this property.

Assuming, with Tye, that an object is black iff it reflects less than 10% of the incident light more-or-less uniformly across the visible spectrum, why *is* black only perceptible against a light surround? Hardin himself has lucidly outlined an explanation of this in the opening part of his paper. The light reaching the eye from an object—the color signal—is the product of the reflectance of the object and the spectral power distribution of the illuminant. Even if we ignore the loss of information due to the small number of types of photoreceptors in the eye, the problem of estimating the reflectance of the object is still seriously underconstrained. Focussing on the achromatic colors for simplicity, a given color signal might be produced by white object in dim illumination, a gray object in medium illumination, or a black object in bright illumination. Faced with this problem, the visual system employs various built-in heuristics: adaptation, and the use of information about other objects in the scene before the eyes. It is not hard to see why, given these heuristics, the visual system would fail to detect that an object was black unless other lighter objects were in the scene.

One more remark before we leave the phenomenon of simultaneous contrast. The following line of reasoning might seem superficially cogent: nothing is black, because the visual experience of black always involves the “illusory” mechanism of simultaneous contrast. But this is a mistake. *Visual mechanisms* (e.g. the mechanism of simultaneous contrast) are neither illusory nor veridical. Rather, it is the *output* of visual mechanisms—visual experiences—that are illusory or veridical. The same mechanism may produce illusory output on one occasion, and veridical output on another.

Hardin’s next objection is of particular interest, and turns on the distinction between unique and binary hues. There is a shade of green (“unique green”) that is neither yellowish nor bluish, and similarly for the three other *unique hues*—red, yellow, and blue. In contrast, every shade of purple is a bit reddish and a bit bluish, and every shade of orange is a bit reddish and a bit yellowish. Purple and orange are accordingly *binary hues*.

Here is Hardin’s original statement of the difficulty this poses for physicalism about color:

If we reflect on what it is to be red, we readily see that it is *possible* for there to be a red that is unique, i.e., neither yellowish nor bluish. It is equally apparent that it is *impossible* for there to be a unique orange, one that is neither reddish nor yellowish...If yellow is identical with **G**, and orange is identical with **H**, it must be possible for there to be a unique **G** but impossible for there to be a unique **H**. If hues are physical complexes, those physical complexes must admit of a division into unique and binary complexes. No matter how gerrymandered the physical

complex that is to be identical with the hues, it must have this fourfold structure, and, if objectivism [i.e. physicalism] is to be sustained, once the complex is identified, it must be possible to characterize that structure on the basis of physical predicates alone. (*Color for Philosophers*, 66)

In the present paper, Hardin summarizes this objection by saying that “the phenomenology of color, including the relations they bear to each other, is not well modeled by features and relationships among spectral reflectances” (15).

This is certainly a fascinating objection, but what is it exactly? Of course, there is a sense in which the reflectance physicalist can easily divide reflectance types into those that are unique, and those that are binary. The reflectance types that are unique are the ones identical to red, yellow, green and blue; those that are binary are the ones identical to purple, orange, olive, and turquoise. Hardin, obviously, thinks that the physicalist owes us more. Hardin might be claiming that, if reflectance physicalism is true, the unique/binary distinction should be a “physically natural classification” of reflectance types (indeed, Hilbert and I have interpreted him that way in previous papers of ours). However, this interpretation does not seem to be correct, because Hardin explicitly notes that Tye’s theory fails to provide such a classification, and yet Hardin does not take this to be problematic.

In any case, I think Hardin might have misunderstood Tye on a crucial point. According to Hardin, Tye thinks that “any spectral stimulus that activates the RED opponent channel and inhibits the GREEN channel but leaves the YELLOW and BLUE opponent channels in equilibrium is to be denominated unique red” (10). Hardin

complains that there is “no such thing as *the* equilibrium point for the BLUE/YELLOW channel” (11). However, as I read Tye, he wasn’t proposing to *analyze* the colors in terms of the activity of the opponent channels, but was simply giving us a rough and ready account of the type of reflectances that he would identify with the various colors, for instance unique red, on the assumption that our color experiences are more-or-less veridical. This rough and ready account is not affected by Hardin’s point about variation between subjects. Tye is just saying (I think) that the type of reflectance that would produce (in normal viewing conditions) an experience of unique red in me, say, is pretty close to the type of reflectance that *is* unique red.

This leads us to Hardin’s well-known example of unique green, which forms the basis of an objection to Tye that is quite distinct from the unique/binary objection. The unique/binary objection—whatever it is, exactly—is directed against physicalism about color, not color realism in general. The unique green objection, on the other hand, is not so narrow. If it works at all, it works against any realistic theory of color that accepts a few attractive assumptions.

Although there is much agreement on what is green, dark-green, and yellowish-green, there isn’t much agreement on what possesses the highly determinate shades, like unique green. Given other claims Tye makes in the book (in particular, that the phenomenology of color experience cannot vary without the content of color experience also varying), he must admit that many of us misperceive the highly determinate shades. Take a stimulus that appears unique green to some. If, as Hardin claims, “No scientific sense can be attached to the claim that some of the observers are perceiving the color of the stimulus correctly and others not” (14), Tye is in big trouble.

But is that really so? Imagine a population of intelligent, reasonably accurate thermometers. Like all measuring instruments, they are calibrated slightly differently. They all agree that the temperature right now is pretty high, around 70°F or so. But some think the temperature is 69°F, while others think it's 70°F, and yet others think it's 71°F. Some of them conjecture that being 70°F is a physical property of some kind, perhaps related to mean molecular kinetic energy. But the thermometers have no theory of intentionality that would enable them to establish conclusively that they are representing physical properties of this sort. And, since they don't have other ways of measuring temperature, they have no "independent test" of whether the temperature right now is exactly 70°F, or even whether it's pretty high. Still, some of these thermometers are perceiving the temperature correctly and others are not. Further, this lack of an independent test need not stop them from forming justified beliefs about the temperature. Perhaps none of them can justifiably believe that the temperature is exactly 70°F, but it seems that they might justifiably believe that it's on the high side, or approximately 70°F.

As for the intelligent thermometers, so for us. Despite presently lacking an independent test of the veridicality of our color experiences, we may be reasonably accurate detectors of the colors of things.

## ***II. The Explanatory Gap***

I now turn to Levine, and the explanatory gap. Largely because of time constraints, I am not going to delve into the intricacies of Tye's official view, as presented in chapter 2 of *Consciousness, Color, and Content*. Rather, I am briefly going to make two points. The first is that, from Tye's perspective—or, more cautiously, from a Tye-inspired perspective—we haven't changed topic. We remain firmly on the subject of Tye's

physicalist theory of color. The second point is that there is a deep connection between the first point and Levine's insightful remarks about the relevance of Russell's doctrine of acquaintance.

Let us begin by noting that even if the above objections to Tye's theory of color can be resisted, another one remains. If redness is identical to a certain reflectance type (call it ' $R$ ') and greenness is identical to another reflectance type, then presumably these identities are necessary. But is it really *necessary* that redness =  $R$ ? Isn't there a palpable contingency here? Imagine attending to the color of a ripe tomato. Surely things could have had *that property* without having  $R$ , or could have had  $R$  without having *that property*. It seems easy to imagine a physical duplicate of this world in which redness and greenness are switched round: in that "inverted colors" world, tomatoes are green, despite changing the incident light in exactly the same way as actual tomatoes. Again, it seems equally easy to imagine a physical duplicate of this world in which nothing is colored: in that "absent colors" world, tomatoes are colorless, despite changing the incident light in exactly the same way as actual tomatoes.

However—to adapt Levine slightly—"it just seems incredible to think that every phenomenon is ultimately constituted by the fundamental physical entities and properties, except the colors, a phenomenon that seems to arise only in the context of certain highly complex physical systems".<sup>6</sup> Somehow the colors *must* be physical properties. Yet if they are, it is altogether mysterious how they *could* be. Any satisfying explanation of why redness =  $R$  would remove the appearance of contingency, but it is very hard to see how

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<sup>6</sup> Cf. Levine, "It is, and yet it isn't—Tye on the explanatory gap" (MS), 1.



the appearance of contingency could be removed. Hence, there is an “explanatory gap” between colors and physical properties.<sup>7</sup>

The original explanatory gap, of course, concerns conscious experience (as it might be, visual experiences of colors), not color. Here is one of Levine’s early statements of the problem:

Let’s call the physical story for seeing red ‘**R**’ and the physical story for seeing green ‘**G**’...When we consider the qualitative character of our visual experience when looking at ripe McIntosh apples, as opposed to looking at ripe cucumbers, the difference is not explained by appeal to **G** and **R**. For **R** doesn’t really explain why I have the one kind of qualitative experience...and not the other. As evidence for this, note that it seems just as easy to imagine **G** as to imagine **R** underlying the qualitative experience that is in fact associated with **R**. (“Materialism and Qualia: the explanatory gap”, 357-8 )

What is the relation between the two gaps: the original one about consciousness and the one about color?

The answer turns on the truth of another of Tye’s doctrines, namely *representationalism* or, as I prefer, *intentionalism*. According to intentionalism (in the version favored by Tye), the phenomenal character distinctive of experiences of ripe

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<sup>7</sup> Cf. Shoemaker, “Phenomenal Character”, in Byrne and Hilbert, *Readings on Color*, volume 1 (MIT Press, 1997), 229.

tomatoes, strawberries, and raspberries—the experience’s “reddishness”, to use Levine’s technical term—is fixed by the experience’s color content. And the kind of content needed to ensure that an experience is reddish is, of course, a content that ascribes redness to external objects (under a distinctive “mode of presentation”, if you like). Similarly, *mutatis mutandis*, for “greenish” experiences—those experiences with the phenomenal character distinctive of experiences of unripe tomatoes, snap peas, and gooseberries.

If intentionalism is correct, then the difference between a reddish experience and a greenish experience is due to a difference in content. Assume, with Levine, that reddish and greenish experiences are “ultimately constituted by fundamental physical entities and properties”—reddish experiences are physical events of kind **r**, say, and greenish experiences are physical events of kind **g**. Is there now some intractable puzzle about why **r**-events are reddish rather than, say, greenish, or why **g**-events are greenish rather than reddish? It would seem not. Although the problem of giving a naturalistically acceptable account of intentionality can hardly be said to have been solved, it isn’t intractable. (At any rate, we may take Levine to agree that it isn’t intractable.) And if it isn’t intractable, there is the possibility of a physicalistically acceptable explanation of why **r**-events represent certain propositions about redness, and not certain propositions about greenness. Given intentionalism, this would be an explanation of why **r**-events are reddish rather than greenish. We may similarly explain why **r**-events have phenomenal character at all: they have phenomenal character because they represent propositions of a certain kind (for instance, certain propositions about the colors and shapes of objects in the environment).

These explanations bridge the original explanatory gap, but at the price of opening up the gap about color. Under the assumption of intentionalism, the yawning explanatory chasm is not the problem of explaining how the physically constituted *internal* world could be *like this* (attending to one's experience of a tomato); instead it is the problem of explaining how the physically constituted *external* world could be *like that* (attending to the tomato).

Suppose now that intentionalism is false: more precisely, that it is false for the familiar inverted spectrum reasons. If a ripe tomato looks red to someone, that does not ensure that her experience is reddish: if she is spectrally inverted with respect to us, her experience is greenish, not reddish. Now it is the *color* gap that disappears. The colors only present a problem if they are constitutively tied to phenomenology; and if intentionalism is false they aren't.

To sum up the first point. An intentionalist of Tye's stripe should start the discussion of the explanatory gap by relocating it. The real gap is the "external" gap between colors and physical properties, not the "internal" gap between experiences and neural events.<sup>8</sup>

The pressing question—assuming that intentionalism is correct—is now this. Can we explain "why we have the intuition that something important is left out" by a physicalist theory of color, and "why this intuition is not to be trusted"? (Cf. CCC, 23) I am not going to try to answer this question, but (this is my second point) I want to

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<sup>8</sup> Cf. CCC, 40, n13.

connect it with Levine's remarks about "acquaintance". Recall this frequently quoted passage from Russell, concerning a particular shade of color that he is seeing:

...so far as concerns knowledge of the colour itself, as opposed to knowledge of truths about it, I know the colour perfectly and completely when I see it and no further knowledge of it is even theoretically possible.<sup>9</sup>

According to Russell, the nature of the colors is completely revealed by ordinary color experience, a doctrine that Johnston calls *Revelation*.<sup>10</sup> If Revelation is true, the colors have no hidden essence awaiting discovery by science; so, in particular, the colors are not types of reflectances.

The explanatory gap for colors is entirely driven, it seems to me, by the plausibility of Revelation. If we find Revelation tempting, no wonder we find physicalism about color mysterious. Conversely, if we are comfortable with the thought that the colors have hidden essences, the identification of, say, redness with a certain reflectance type should not occasion much puzzlement. So, if the explanatory gap for colors is a "cognitive illusion", the temptation to endorse Revelation must be diagnosed away. And to do that, we need to find some feature of the visual representation of colors

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<sup>9</sup> Quoted by Johnston, "How to speak of the colors", in Byrne and Hilbert, 138. (The quotation is from *The Problems of Philosophy*.)

<sup>10</sup> "How to speak...", 138.

that leads us to think, mistakenly, that their natures are completely exposed in visual experience.