

## Truest Blue (longer version<sup>\*</sup>)

Alex Byrne and David R. Hilbert

### 1. *The “puzzle”*

Physical objects are coloured: roses are red, violets are blue, and so forth. In particular, physical objects have fine-grained shades of colour: a certain chip, we can suppose, is true blue (unique, or pure blue). The following sort of scenario is commonplace. The chip looks true blue to John; in the same (ordinary) viewing conditions it looks (slightly) greenish-blue to Jane. Both John and Jane are “normal” perceivers. Now, nothing can be both true blue and greenish-blue; since the chip is true blue, it is not greenish-blue. Hence Jane, unlike John, is misperceiving the chip. Generalizing, the conclusion is that there is widespread misperception of fine-grained shades.

According to Tye (2006), and Cohen, Hardin, and McLaughlin (2006), the previous paragraph amounts to a paradox: an apparently unacceptable conclusion has been drawn from apparently acceptable premises via apparently acceptable reasoning. (See also Hawthorne and Kovakovich 2006, 180-1.) Tye swallows the conclusion, aided by a dose of evolutionary speculation. Hardin (1988), on the other hand, rejects the first premise, and denies that physical objects are coloured. Cohen (2004) and McLaughlin (2003) claim that both Jane and John have the colour of the chip right. Our opening paragraph concealed a crucial parameter. In fact, the chip looks greenish-blue-relative-to-circumstances-C to Jane, and true-blue-relative-to-circumstances-C\* to John, and the chip has both these relativized colours.<sup>1</sup>

All this ingenious philosophizing would be in vain, of course, if the conclusion of the opening paragraph were not puzzling or problematic. So, why is it supposed to be?

According to Tye, the conclusion is puzzling because John and Jane are both “normal perceivers” (xx). He seems to think that it is (prima facie) plausible to assume

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<sup>\*</sup> This is a slightly expanded version of our paper “Truest Blue”, forthcoming in *Analysis*.

<sup>1</sup> Another option would be to deny that true blue and greenish blue are contraries, as in Watkins 1994. Like Tye and Cohen et al., we will assume as background that perceptual experience has representational content; that might be denied (see, e.g., Travis 2004), and if it is the debate needs to be stated somewhat differently.

that there is no variation in perceptual accuracy among normal perceivers. But he does not explain why this assumption should be made. Normal humans, on any reasonable statistical interpretation of ‘normal’, differ in numerous ways.<sup>2</sup> In particular, they differ perceptually—in visual acuity, for example, as measured by the familiar optometrist’s chart. Recovering the layout of one’s environment from the retinal stimulus is such a difficult problem it is amazing that it works at all. Given its astonishing complexity, it is hardly surprising that our visual apparatus is often unreliable when pushed to the limits of its resolution, and hardly surprising that it might be calibrated slightly differently in John and Jane (Byrne and Hilbert 2004).

Tye himself comes close to these points in his discussion of the speedometer (xx-yy). John and Jane are both driving at 30mph; John’s speedometer reads ‘30’ while Jane’s reads ‘32’. “Minor misperception” of speed by cars is perfectly common and unproblematic. Unfortunately, however, the helpful speedometer analogy is mixed in with a controversial proposal according to which “fine-grained [colour discriminations] are of adaptive significance” (xx), which Tye later goes on to reject; we will say something about this in sections 2 and 3 below.

Tye does not show that there really is a puzzle of true blue; do Cohen, Hardin, and McLaughlin do any better? In their paper, they tacitly endorse Tye’s reason for regarding the conclusion with suspicion. And nothing more compelling is present in their individual writings. Hardin, to whom we owe the first attempt to state the puzzle, does not spell out his reasoning explicitly. The argument closest to the surface in Hardin 1988 and Hardin 2003 is that the hypothesis that John, not Jane, is the veridical perceiver makes no sense because it is not verifiable (Byrne and Hilbert 2004, 37-9; see also Byrne and Hilbert 2003, 16-7 and 56-7). This tune from Old Vienna, it goes without saying, does not sound convincing. (We stop short of firmly pinning this argument on Hardin.) The puzzle is certainly genuine for McLaughlin (see 2003, 117-24), but that is because of his

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<sup>2</sup> Tye’s use of ‘normal’ on p. xx should be distinguished from the capitalized ‘Normal’ that appears elsewhere in Tye’s paper, which is not to be interpreted statistically (see the following footnote). Tye uses lower-case ‘normal’ to paraphrase a point made in Block 1999, and Block himself evidently has a statistical interpretation in mind.

theoretical commitment to a sophisticated form of color dispositionalism; those who do not share this commitment (like ourselves and Tye) are not given any cause for concern.

Cohen has probably devoted the greatest amount of ink to motivating the puzzle of true blue. The problem, he insists, is that “it is extremely hard to imagine what could (metaphysically) make it the case that one of the representational variants [e.g. John’s] is veridical at the expense of the other [e.g. Jane’s]” (2006, 310; see also Cohen 2004). However, it really isn’t that difficult. Presumably it is not puzzling why the chip looks true blue to John and greenish-blue to Jane. That *would* be puzzling if John and Jane were in the same brain states, but (we may safely suppose) they aren’t: they differ in many visually relevant respects. On the side of the chip, presumably it is not puzzling why it is unique blue and not greenish-blue. That *would* be puzzling if the chip didn’t interact with light (for example), but it does: it is an ordinary opaque uniform chip. Putting the two together, what “makes it the case” that John, not Jane, is perceiving the chip correctly, is that it looks true blue to John, greenish-blue to Jane (no problem so far), and the chip *is* true blue, not greenish-blue (likewise, no problem). (See Byrne 2006.)

There is no puzzle of true blue. But suppose, for the sake of the argument, that there is.<sup>3</sup> Has Tye solved it?

## **2. The “solution”**

Tye discusses two ways to make the opening paragraph’s conclusion palatable. The first distinguishes between the privileged perceivers who “get the fine-grained colours right” and those that do not by appeal to evolutionary considerations (xx). The privileged perceivers have colour vision that meets “the historical design specifications” (xx) imposed by Mother Nature. There is supposed to be a close connection between the design specifications and veridicality: “Normal” perceivers veridically perceive the fine-grained shades in certain “Normal” environments.<sup>4</sup> Because Normality depends on a

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<sup>3</sup> For yet another attempt to explain why there is a puzzle, see Matthen 2005, 203-4.

<sup>4</sup> Clearly Tye is using ‘Normal’ in the sense of Millikan 1984: Normal systems are those that function as “designed” by natural selection, Normal conditions are those to which such systems are adapted, and Normal perceivers are those whose perceptual systems are Normal. That a viewing condition or perceiver is Normal has no statistical implications. In particular, it is neither necessary nor sufficient for Normality that

mass of small evolutionary details, an abnormal perceiver might be much like a Normal one. Hence it is unmysterious why John, but not Jane, veridically perceives the colour of the chip—conditions are Normal, and he is the only Normal perceiver.

Tye rejects this proposal on the ground that the historical design specifications probably did not mention fine-grained shades—there is no clear selective advantage to the ability to identify a particular object as true blue as opposed to slightly greenish-blue.<sup>5</sup> His preferred solution agrees with the first proposal on *coarse*-grained colours like red and blue, and likens the representation of fine-grained shades to superfluous (non-adaptive) precision—like a stopwatch accurate to 1/100th of a second that is used as an egg timer.

Cohen et al. reply by claiming that there is variation among those with standard colour vision even at the coarse-grained level.<sup>6</sup> Sometimes an object will look blue to one

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the viewing conditions or perceivers be those identified by any of the (population based) standards of colour science.

It is worth noting that the attempt to classify *perceivers* as either Normal or abnormal cannot work for Tye's purposes, because (to give just one reason) there is variation *within* individual perceivers, keeping the viewing conditions fixed. Rather, the visual system (and so, derivatively, perceivers) should be taken to be in a Normal state at some times, and an abnormal state at other times. Probably Tye left out this complication to simplify his discussion.

<sup>5</sup> Tye sometimes talks of discrimination and sometimes of identification. Although related, these are distinct perceptual abilities. Veridical perception of color difference (discrimination) does not entail veridical perception of the colors of the things that differ (identification). The puzzle of true blue concerns identification, not just discrimination. Focusing on discrimination and not identification can make Tye's first proposal appear less problematic than it is. Discriminating true blue from slightly greenish-blue may well be advantageous, even if identifying an object as true blue is not. Slight colour differences can mark material boundaries and so can have a significance independent of the correct identification of the differing colors.

<sup>6</sup> They cite Malkoc et al. 2005 in support. Although we don't doubt the truth of the claim itself this reference is not particularly apt. Malkoc et al. used a color-naming protocol and the within-subject variability was almost as large as the between-subject variability. This suggests that subjects found the naming task difficult and complicates the interpretation of the results. The variability may have mostly resulted from difficulty in applying color terms to the stimuli used rather than any difference in appearance. Cohen et al.'s appeal to Neitz and Neitz 1998 in footnote 6 to address this worry is puzzling: the main

subject (Jack, say) and purple to another (Jill). However, this is not a good objection. Tye's position implies, not that this sort of situation is impossible, but that there is some departure from Normality in either Jack, Jill, or the viewing conditions. Admittedly, it would be nice to have more evolutionary details, and if disagreement at the coarse-grained level were rampant this would cast considerable doubt on any adaptive story. But Cohen et al. offer no evidence that this is the case—and anyway it obviously isn't.

The real trouble with Tye's proposed solution comes when we ask why the color vision system bothers to represent fine-grained shades at all, given that the extra level of detail is allegedly unwanted. Why couldn't the color vision system just represent coarse-grained colors, as an egg timer might just represent minutes? (Actually, on Tye's account, one might have expected selection to favor *not* representing the fine-grained shades—loading up the organism with unnecessary and unreliable representations might well detract from its fitness.) Tye does not answer that question—he does not pretend to explain why the human visual system represents fine-grained shades like true blue and (slightly) greenish-blue.

In essence, then, Tye's "solution" amounts to this: the chip looks true blue to John and greenish-blue to Jane (for some unexplained reason), and the chip is true blue, not greenish-blue. (The account of the coarse-grained colours, criticized by Cohen et al., plays no important role.) The difficulty is not that this "solution" is wrong, but that if it is correct there cannot possibly have been any problem in the first place.

### ***3. Psychosemantics and evolution***

Tye's just-discussed proposal outlines a "naturalistic" account of the representation of the coarse-grained colours—a "psychosemantics". He does not suggest a psychosemantics for the fine-grained shades. It might be thought that it is precisely the *absence* of such a psychosemantics that leads to a genuine puzzle of true blue. If there is no naturalistic account of how John's visual system is representing the chip as true blue, isn't that a worry? Well, perhaps, but it is important to realize that this cannot motivate *rejecting* the opening paragraph's conclusion, and accepting either Hardin's eliminativism or

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claim of Malkoc et al. is that the observed variability is *not* explainable by appeal to the genetic factors discussed by Neitz and Neitz.

McLaughlin and Cohen's relativism. It is easy to see that these positions make psychosemantics *harder*, not easier.<sup>7</sup> Even if perceptual representation of fine-grained shades is a riddle wrapped in a mystery, there is still no puzzle of true blue.

We hold no brief for Tye-style teleological theories of representation, and in fact are somewhat chary of the whole psychosemantical enterprise, particularly as construed as a project from the armchair.<sup>8</sup> Having said that, in this final section we will make some constructive remarks intended to improve the prospects of a teleological account of the representation of colours.

Colour identification contributes to at least two visual abilities. First, the ability to recognize and remember individual conspecifics, who can often be distinguished by distinctive colouration. Among primates (in whom our form of trichromatic colour vision evolved), the identification of individuals is important for social interaction, and is often visually mediated, plausibly with fine-grained shades among the cues.

Second, colour identification contributes to the ability to detect useful properties of objects. As fruits ripen even small differences in colour can signal significant differences in flavor and nutrition. For example, the difference between a nearly inedible banana and a fully ripe one is often indicated by the difference between a distinctly greenish-yellow and a somewhat less greenish-yellow.

Thus Tye is wrong in supposing that there is no adaptive significance to the representation of any fine-grained shades.<sup>9</sup> However, he is surely right that it is implausible to think that the representation of *each* fine-grained shade was the object of selection in its own right. Perhaps the ability to identify true blue objects, by itself, is no advantage, in which case wouldn't that ability have been left by the wayside? No, it

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<sup>7</sup> Eliminativism makes it harder because typical psychosemantic theories assume that the represented properties are instantiated; relativism makes it harder because it cuts shades considerably finer.

<sup>8</sup> Contrary to what Cohen et al.'s footnote 5 suggests.

<sup>9</sup> Tye distinguishes (i) what we might call the *maximally* fine-grained shades like true blue and (ii) determinable colours like blue and purple; he ignores *intermediate* shades like scarlet and slightly-greenish-blue (or else tacitly lumps them in with the maximal shades). We are fudging the maximal/intermediate distinction ourselves for reasons of space. A fuller treatment of the constructive suggestion to come would take this distinction into account, as well as the adaptive significance of discrimination (see footnote 5 above).

wouldn't. Colour vision is very likely to a large extent a package deal: the representation of colour, fine- or coarse-grained, is *systematic* and plausibly selection did not even have the option of favoring those with the ability to identify true blue and not those with the ability to identify greenish-blue. Having a colour vision system, with the consequent ability to identify a variety of fine- and coarse-grained colours, confers a selective advantage. Given that the colour vision system comes as a more-or-less complete package, natural selection might have produced the ability to represent shades like true blue, even if that colour had never played any significant role in the ancestral environment.

Here is an analogy. Suppose an advantage accrues to those individuals who are able to detect that the pressure of their bicycle tyres is either 100psi (the manufacturer's recommended pressure), too high (approximately greater than 110psi) or too low (approximately less than 90psi). This drives the "evolution" of a gadget that does these things. As it happens, the only feasible (cheap, easy to manufacture) device that detects (in "Normal" conditions) the three crucial pressures (100psi, "too high", and "too low"), is one that *also* detects other "fine-grained" pressures like 95psi and 107psi. There can be selection *for* a gadget that in fact detects the fine-grained pressure 95psi, even though this is a "spandrel"—a side effect of no adaptive significance.

If something like this story for colour vision is correct, then the prospects for a teleological psychosemantics are a little brighter. It is advantageous to have a perceptual system that indicates, in certain privileged conditions, a variety of ecologically significant coarse and fine-grained colours. All such evolutionarily available systems also indicate other coarse and fine-grained colours, despite their ecological unimportance. Perhaps: a state S represents true blue because it is part of a system that was selected for its ability to indicate *other* (coarse- and fine-grained) colours in certain conditions, and S indicates true blue in those conditions.

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