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Color Relationalism and Relativism[*]

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On a natural and simple view of color, the colors are qualities or properties of external objects like tomatoes and emeralds, detectable through sight. One such quality is greenness, a quality incompatible with other determinable colors, like redness: nothing can be red and green (all over). The determinable greenness has determinate shades: emerald green, pea green, yellowish-green, and so on. These determinates themselves may be incompatible (nothing can be emerald green and pea green) or alternatively compatible (pea green is a kind of yellowish-green). Perhaps these platitudes should not be dignified as a "view", but for convenience let us label them the *naïve view* of color.

At least if color eliminativism, the view that nothing is colored, is off the table, the naïve view might seem pretty much impregnable. It is compatible with the theory that colors are "objective" properties that we (imperfectly) detect; it is also compatible with the theory that colors are "subjective" properties, somehow constitutively connected with our visual systems, or with color appearances. What's not to like?

As some philosophers see it, what's not to like is that the naïve view allows for cases of irresoluble genuine disagreement about the colors of things. Variation in human color vision means that, on the naïve view, a certain chip might appear to have incompatible colors to Brit and Mitt, both normal perceivers viewing the chip in excellent lighting conditions. To Brit, the chip looks unique green—a shade of green that is neither bluish nor yellowish—while to Mitt it looks slightly yellowish. If we imagine that Brit and Mitt express their perceptual "disagreement" verbally, neither is going to be persuaded of the other's position. Further, on the naïve view, this sort of irresoluble disagreement between normal perceivers isn't just limited to highly determinate shades like unique green. There is general agreement about the determinable colors, of course,

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but there are exceptions. We may imagine Brit and Mitt having a familiar and pointless domestic spat over whether a greenish-bluish tie is blue or green.

Since, on the naïve view, nothing can be unique green and yellowish-green, either Brit or Mitt is misperceiving the chip. But, it is often claimed, it would be objectionably asymmetrical if Mitt were veridically perceiving the chip and Brit misperceiving it, or vice versa, and the view that both are misperceiving the chip should also be avoided. Somehow, this has to be a case of "faultless disagreement": at least at the level of perception, Brit and Mitt are *both right*.[1]

1: Relationalism and relativism

How could it turn out that both Brit and Mitt see the chip in its true colors? There is a straightforward way and a less-straightforward way. The straightforward way is *relationalism*, the less-straightforward, *relativism*. (Warning: these terms are not used uniformly[2].) Let us take them in turn.

1.1 Relationalism

There is no such thing as being poisonous *simpliciter*.[3] Rather, there is a family of relational properties, *being poisonous to humans, being poisonous to rats, being poisonous to Brit*, and so on. Relationalism is an analogous thesis about color. Just as a single thing may be poisonous to Brit and not poisonous to Mitt, so our chip may be unique green (not yellowish green) to Brit and yellowish green (not unique green) to Mitt.

An early version of relationalism is defended in McGinn's *The Subjective View* (1983). Starting from the "Lockean" assumption that colors are dispositions "to produce sensory experiences in perceivers of a certain phenomenological character" (1983: 5) he then remarks that:

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[1] 'Faultless disagreement' is from Kölbel 2004, although his use of the term is narrower (and more precise) than ours.

[2] In Byrne and Hilbert 2003b, 'relativism' was used for what is here called 'relationalism'. More importantly, our use of the latter term departs from that of Cohen 2009: see note 7 below.

[3] Or so we may assume; for the (minority) contrary view see Cappelen and Lepore 2005.

> the dispositional thesis implies the relativity of [colours]; for the question arises, to which perceiver or perceivers the red object is disposed to look red…Thus suppose that a given range of objects looks systematically red to us and systematically green to Martians, and suppose our and their colour discriminations are equally fine. Then there will be no choosing between these groups of perceivers in respect of whose experience determines the colour of the objects in question…This relativity implies that there is no genuine disagreement between us and the Martians when they call an object green which we call red; for all these colour ascriptions assert is that the object looks green to them and red to us. It is thus entirely proper to speak of objects as red with respect to perceiver *x* and green with respect to perceiver *y*…There is thus a sense in which an object has (or could have) many contrary colours simultaneously.[4]

If Brit and Mitt can be treated like the Martians, the chip is both "unique green with respect to Brit" and "yellowish-green with respect to Mitt"; Brit sees the chip as having the former color, and Mitt the latter, and the chip has both colors.

What is it to be "unique green with respect to Brit" or, more generally, to be "color *c* with respect to perceiver *x*"? The quotation from McGinn apparently gives an answer: to be color *c* with respect to perceiver *x* is to be (disposed to) *look c* to *x*. But now there is a problem. Return to the example of poisonousness—in fact, an example used by McGinn (10) to illustrate the relationalist thesis. Certainly, some things are "poisonous with respect to *x*" but not "poisonous with respect to *y*": for example, this strawberry bush is poisonous with respect to Brandy (a human) and not poisonous with respect to Bambi (a deer). What is to be "poisonous with respect to *x*"? Suppose someone gave this answer:

(1) *o* is poisonous with respect to *x* iff *o* is disposed to look poisonous to *x*

The problem is not that (1) is implausible, but that it is *not even false*. Relationalism about 'poisonous' means that there is no such thing as the property of being poisonous *simpliciter*: to be "poisonous" is always to be poisonous *with respect to so-and-so*. Thus 'poisonous' on the right hand side needs to be interpreted appropriately, and there are

[4] Footnotes omitted. McGinn credits the last observation to Keith Campbell.

indefinitely many ways of doing that. Before that is done, the question of (1)'s truth or falsity does not arise.

Suppose, then, 'poisonous' on the right hand side is replaced with an expression of the form 'poisonous with respect to so-and-so'. Even if the resulting thesis is true, it clearly offers no *explanation* of what it is to be "poisonous with respect to *x*", since the relational locution is being used on both sides of the biconditional.

Recapitulating these points in the case of color, McGinn's first attempt at explaining what it is to be "color *c* with respect to *x*" is:

(2) *o* has color *c* with respect to *x* iff *o* is disposed to look *c* to *x*

By the relationalist's lights (2) is not even false, because there is no such thing as the property of having color *c simpliciter*. Thus '*c*' on the right hand side needs to be interpreted appropriately, and there are indefinitely many ways of doing that.[5] Hence (2) needs to be replaced with this:

(3) *o* has color *c* with respect to *x* iff *o* is disposed to look *c*-with-respect-to-*y* to *x*

(The hyphenation emphasizes that the whole phrase, '*c* with respect to *y*' specifies the way *o* is disposed to look.) And again, even if (3) is true, it clearly offers no *explanation* of what it is to have "color *c* with respect to *x*", as the relational locution is being used on both sides of the biconditional.

In the case of 'poisonous with respect to *x*', there is no great mystery. The strawberry bush is poisonous with respect to Brandy—or, more colloquially, poisonous *to* Brandy—because (roughly) eating the plant causes Brandy to be sick. However, matters are quite different for 'color *c* with respect to *x*'. What does *that* mean? We have already seen what it can't mean, namely *looks* c *to* x. We will return to this issue later (section 3.3). Since Cohen's book *The Red and the Real* (2009) is the most comprehensive and sophisticated case for relationalism in the literature, we will follow his terminology and

[5] Here we are making the (very plausible) assumption that 'c' is univocal on both sides, just as 'poisonous' is univocal on both sides of (1).

use ‘color *c* for S in (perceptual circumstance) C’ in place of McGinn’s ‘color *c* with respect to *x*’.[6]

It is worth noting a corollary of the above discussion, namely that McGinn’s claim that “the dispositional thesis implies the relativity of [colours]” (i.e., implies relationalism) is incorrect. If the dispositional thesis is stated as McGinn sometimes states it, that to be red is to be disposed to look red, and if (as this formulation suggests) ‘red’ simply picks out the unique property of redness, then the dispositional thesis is *inconsistent* with relationalism. It is true, as McGinn goes on to say, that “the question arises, to which perceiver or perceivers the red object is disposed to look red”. But although the availability of this question suggests that (according to the dispositional thesis) redness is a *relational property*, it does nothing at all to support relationalism.[7]

1.2 Relativism

Relationalism multiplies perceptible properties. In particular, there are many “unique greens”: unique green for Brit in C, unique green for Mitt in C*, and so on. Apart from the vexing issue of how to understand the locution ‘color *c* for S in C’, the unique-green properties are straightforward relational properties.[8] Relativism, on the other hand, trades a multiplicity of properties for a multiplicity of parameter-values relative to which an object is unique green. According to the relativist there is just one property, unique green, but objects do not have this property *simpliciter*: one and the same object may be unique green, relative to Brit and C, and yet not unique green, relative to Mitt and C*. And if

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[6] Apart from McGinn, other notable defenses of relationalism are Jackson and Pargetter 1987 and McLaughlin 2000, 2003.

[7] *Being married* is a relational property, but there is such a thing as being married *simpliciter*, and so (on our usage) relationalism about marital status is false. Cohen’s usage is different: color relationalism, as he defines it, is the view that colors are “constituted in terms of relations to subjects” (2009: 7); that is, are relational properties with “subjects” as one of the relata. Cohen thus counts dispositionalism (i.e. McGinn’s “Lockean assumption” in section 1.1) as a version of relationalism. However, Cohen himself holds the stronger thesis, “the relativity of [colours]” in McGinn’s phrase—that is, relationalism in our sense.

[8] For present purposes, it doesn’t matter whether a “relational” property is a metaphysically special kind of property, as opposed to merely being a property that is conveniently referred to by a relational expression. See also Cohen 2009: 8-10.

objects do not have this property *simpliciter*, the proposition that an object has it is not true *simpliciter*: it is true relative to Brit and C, false relative to Mitt and C*.

This idea has been developed by Egan (2006a, 2006b, 2012), and is defended by Brogaard (2009, 2010, 2012).[9] (Egan himself is uncommitted.) Although there might be some respects in which relativism is more attractive than relationalism (Egan 2012: 311), the relativist apparatus is quite controversial. Egan, for example, takes Lewis (1979a) to have motivated the introduction of relativized properties (Egan prefers to call them 'centering features'), but this is quite disputable. (See, e.g., Stalnaker 1981, Cappelen and Dever 2013: ch. 5, Magidor forthcoming.) Sometimes it is suggested that since truth is at least relative to a possible world, adding other parameters could hardly be objectionable in principle. But it is quite doubtful that truth is relative to worlds. (See, e.g., Soames 2011; for a critical treatment of relativism in general, see Cappelen and Hawthorne 2009.) As we are in sympathy with these criticisms, and as the main problems for relationalism arise equally (sometimes in a different guise) for relativism, we will mostly concentrate on relationalism.

2: The argument from perceptual variation, and the naïve view

The plausibility of relationalism and relativism depends entirely on an argument that we briefly described at the start of this paper, the "argument from perceptual variation". Since these views are unmotivated if the argument fails, it is crucial to examine it carefully.[10]

Let us set out the argument from perceptual variation using the example of Brit and Mitt. Brit and Mitt both have normal color vision, as measured by standard tests. They are looking at a chip in ordinary lighting conditions. Although the focus is on perception, not language, for vividness we may suppose that Brit says 'The chip is unique

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[9] Brogaard uses 'perspectivalism' for what we are calling 'relativism' (2010: 256). A related and more complicated view is in Chalmers 2006. Cohen himself is not unsympathetic to relativism (2012), although he maintains that relationalism is superior (2015).

[10] Cohen (2009: 26-36) gives versions of the argument for three types of cases: cross-species variation, interpersonal variation, and intrapersonal variation. We think the cross-species cases raise quite different issues and will not discuss them here (see Byrne and Hilbert 2003a: 15-6). Intrapersonal cases don't add anything to the more straightforward interpersonal cases so we will focus on the latter.

green', and Mitt retorts 'The chip isn't unique green, it's yellowish-green'. The argument from perceptual variation then runs as follows:

P1 The chip looks different to Brit and to Mitt.

P2 Brit is veridically perceiving the chip iff Mitt is.

The best explanation of P1 and P2 is:

C1 Relationalism is true.

Or, alternatively:

C2 Relativism is true.[11]

P1 is not in doubt: there is genuine variation in color *vision*, not just in the use of color vocabulary.[12] But, according to the naïve view, P2 is false, at least on one way of elaborating the situation. The way the chip looks to Brit is unique green; the way the chip looks Mitt is yellowish green, and the chip can't be both unique green and yellowish-green. Presumably the chip is some shade of green—suppose it is unique green. Then Brit sees the chip as it is, and Mitt doesn't. (More exactly, although Mitt veridically perceives the chip as green, he misperceives it as yellowish-green.)

It is important to stress how unobjectionable the above argument against P2 seems. It is completely commonplace to describe illusions or misperceptions as cases where an object looks some way that it isn't; in particular, color illusions are routinely said to be situations where the color a thing looks is not its real color. It is also completely commonplace to think of colors as incompatible, and as paradigm cases of monadic properties. That we see objects as having fine grained shades, and that these are subject to interpersonal variation, is unsurprising from an evolutionary point of view.[13]

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[11] Whether relativism could explain P2 is less than clear. According to the relativist, the chip is unique green "relative to" (inter alia) Brit and not unique green "relative to" (inter alia) Mitt. Does Brit veridically perceive the chip? That depends on whether veridicality is understood as relative to Brit, or to Mitt. Since the relativist wants to secure the result that Brit veridically perceives the chip, he needs to argue that relativity to Brit is what counts.

[12] Strictly speaking, what is not in doubt is the pedantic version of P1 that does not employ the fiction of Brit and Mitt.

[13] See Byrne and Hilbert 2007: 87-8; 90-1, fn. 6.

Further, this sort of phenomenon has parallels for other perceptible properties. For example, we may imagine Brit and Mitt disagreeing over whether a certain picture is hung crookedly. What, then, is the argument that—no matter how the details are filled in—P2 is true?

2.1 Unknowable color facts?

Suppose that P2 is false; in particular, suppose that the chip is unique green, and so Brit is right. It is hard to see how we could know that she is. The naïve view arguably leads to "unknowable color facts". Here is a perfectly ordinary unique green chip, which we can look at in whatever lighting conditions we choose. Nonetheless, we can never know that it is unique green.[14] Is this a problem? Not according to Cohen: "I am not convinced that...unknowable color facts are…objectionable" (2009: 49). Brogaard, however, sees a difficulty with this "radical epistemicism":

> …radical epistemicism entails that all answers to questions of the form *what is o's color?* are unknowable. This raises the question of how we know the meaning of color terms and color discourse. For example, how do I know the meaning of *red*? One plausible answer is that I know it through introspection of my own phenomenally red experiences. However, the redness of my own red experiences needn't be correlated with redness. Objects that normally prompt phenomenally red experiences in me could be orange. If color spectrum inversions are possible, they could be green. Byrne & Hilbert, it seems, must deny either that most of us know meanings of color terms and color discourse, or that meanings of color terms are correlated with color facts. Both options seem implausible. (Brogaard 2010: 255-6)

The first point to make about this passage is that Brogaard has seriously exaggerated the extent of "radical epistemicism", at least insofar as it is motivated by empirical facts about variation in color vision. It does *not* entail that all answers to questions of the form

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[14] The worst-case scenario may just be *collective* unknowability: *Brit* can know that the chip is unique green, but *we* can't. The issues here overlap with the literature on "disagreement" (see, e.g., Lackey and Christensen 2013).

'What is *o*'s color?' are unknowable. On the contrary: red cabbages are purple, lemons are yellow, and peas are green. More specifically, red cabbages are reddish-purple, lemons are close to unique yellow and peas are yellowish-green. At worst, what is unknowable is that this pea is such-and-such highly determinate shade of yellowish-green, or that that lemon is unique yellow.

Is there a specific worry about the meaning of (mildly esoteric) terms like 'unique yellow'? Suppose one is taught the meaning of 'unique yellow' by being shown samples of objects (lemons, say) that are presumed to be unique yellow. Further suppose that this procedure in effect indicates to the student that 'unique yellow' refers to the apparent color of the samples. (Brogaard seems to have something like this in mind when she says that it's plausible that the meaning of color terms is known by "introspection".) Then widespread variation in color perception will lead to widespread variation in the interpretation of 'unique yellow'. That is the first horn of the dilemma Brogaard poses at the end of the quotation. The second horn appears to be the rejection of the ostensive model of the acquisition of terms like 'unique yellow'. Whatever the merits of the ostensive model for terms like 'red' and 'yellow', it clearly fails for 'unique yellow'. 'Unique yellow' is not introduced by ostension, but rather by defining it as a shade of yellow that is neither reddish nor greenish.[15] So we may comfortably sit on the second horn.

2.2 Problems with "normal perceivers"?

Although Brogaard clearly thinks her arguments work against the naïve view, her official target in the paper just cited is "objectivism", which comes in (at least) two flavors. The first is "objectivist reflectance physicalism", according to which colors are "disjunctive properties of reflectances that give rise to certain phenomenal effects in normal human perceivers in normal viewing conditions", while the second is "objectivist dispositionalism", according to which "colors are dispositions to give rise to certain

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[15] The names for the unique hues are quite atypical in this respect. The names for the fine-grained shades one finds in paint catalogs are not defined in terms of other color vocabulary, but instead *are* (in a sense) introduced by ostension. This does not help Brogaard, however: a paint name like 'Heritage Red' has its reference fixed by *the color* of certain physically specified samples, not by their *apparent* color.

phenomenal effects in normal human perceivers in normal viewing conditions" (2010: 254).[16]

If a "normal perceiver" is taken to be someone who passes standard tests for normal color vision, then perceptual variation shows that nothing looks unique green to normal human perceivers in normal viewing conditions. (Here it really doesn't matter what "normal viewing conditions" are supposed to be.) One natural way of specifying the relevant "phenomenal effects" in Brogaard's characterization of the two kinds of objectivism is in terms of 'looks', for instance 'looks yellow' or 'looks unique green'. Given this understanding of "phenomenal effects", both forms of objectivism are straightforwardly threatened by perceptual variation, because they have the bizarre consequence that although some objects are yellowish-green and some are bluish-green, nothing is unique green.[17] According to "objective reflectance physicalism", for example, something is unique green iff it has the disjunction of reflectances R_{ug} such that an object's having R_{ug} will cause it to look unique green to "normal human perceivers in normal viewing conditions". Since there is no such disjunction, nothing is unique green.

There is nothing here to immediately alarm the proponent of the naïve view, but trouble is brewing if Brogaard has shown that color physicalism, in particular, is false. There is some pressure to identify the colors with physical properties—for one thing, our color vision system seems well-designed for detecting how objects alter light, so the

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[16] Brogaard's "disjunctive properties of reflectances" are better characterized as disjunctive *types* of reflectances.

[17] For a defense of this consequence on quite different grounds, see Gert 2006; Gert also denies that unique green is a color, because it is not "the possible color of any object" (2012: 325). To bring out the bizarreness of admitting that things are bluish-green and yellowish-green while denying that anything is unique green, imagine adding a drop of blue paint to a pot of yellowish-green paint, stirring, and repeating. Every additional drop changes the color of the paint in the pot (to be on the safe side, we can suppose that each drop makes a slight visible difference). The paint in the pot becomes progressively less yellowish and eventually turns bluish-green, so a highly plausible hypothesis is that there is a stage in the sequence where the paint is neither bluish nor yellowish—that is, unique green. (Or if not *exactly* unique green, then a shade that is *very close* to unique green; this will do, since the view we are objecting to also implies that nothing is very close to unique green.)

default assumption should be that colors are certain modes of optical interaction.[18] The naïve view can happily take physicalism on board, but if physicalism is false then the spectre of eliminativism looms on the horizon. And given a choice between eliminativism and P2, the latter might well seem more attractive.

However, although Brogaard has a completely convincing objection against "objective reflectance physicalism", as she defines it, color physicalism itself is unscathed. For there is no reason why the statement of color physicalism should mention "normal" perceivers, and (as Brogaard brings out) every reason why it shouldn't. "Reflectance physicalism" (Hilbert 1987, Byrne and Hilbert 2003a), for example, is simply the view that the colors are kinds of spectral reflectances. Very plausibly, no constitutive connection holds between a traditional "primary quality" like length and normal perceivers; since reflectance physicalism—at least as it is developed in the literature just cited—treats colors as primary qualities, there is no evident need for a constitutive connection here either.[19]

2.3 Argument by elimination?

Cohen sums up his case for P2—that Brit is veridically perceiving the chip iff Mitt is—as follows:

> ...the conclusion that there is no uniquely veridical variant was reached by appeal to the phenomenon of variation together with an inductive case against the viability of claiming the unique veridicality of any particular variant. What we observed was that, in instance after instance of variation with respect to color, the most promising attempts to single out a uniquely veridical variant required stipulations that are ultimately unacceptable. (Cohen 2009)[20]

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[18] This is entirely compatible with (a) the fact that the apparent color of an object depends on the light from the entire scene (cf. the "fallacy of localization" in Hilbert 1987: 66-8), and (b) the fact that the color vision system is also involved in the detection of motion and form.

[19] We have stressed this point (e.g. Byrne and Hilbert 2003b: 55). Brogaard, however, classifies us as "objective reflectance physicalists" (264, n. 2); Tye is her other example, and here her interpretation is defensible (see Tye 2000: 160-1) although still, we think, incorrect.

[20] P2 is our version of Cohen's premise (2) (2009: 24).

What are these "most promising attempts"? In fact, they are *all* variations on the theme of "normal perceivers": whether Brit or Mitt is correct will depend on which one is "normal". But what is it to be "normal"? We saw in the previous section that normality cannot amount to passing standard tests for normal color vision. Cohen considers two other possibilities: that normality is "set by numerical majority" (31), and that it is set by the CIE 1931 Standard Observer (31-2). Unsurprisingly, he easily dispatches these suggestions. Since the naïve view does not appear on Cohen's list of promising attempts, his argument by elimination fails to cover the simplest alternative to his own position.

2.4 Failure to explain how one variant could be correct?

The naïve view claims that at most one of Brit and Mitt sees the chip in its true colors, and so P2 is false. The chip, we are supposing, is unique green, which means Brit is the lucky perceiver. She is (to use Cohen's terminology) the "veridical variant".[21] What explains why Brit is the veridical variant? Cohen sees a problem here:

> It is of course correct...that a variant counts as veridical iff (i) it represents the color of the chip as being some way, and (ii) the color of the chip is indeed that way. That amounts to a correct statement of what it means for a variant to be veridical. But it does nothing to explain what makes it the case that one variant meets this condition at the expense of the others. Byrne and Hilbert have supplied vocabulary in terms of which we can re-raise the question they purported to be answering; but they have done nothing to answer it. (2009: 47, fn. 2)

The question at issue is this: what makes it the case that Brit sees the chip as it is, and Mitt doesn't? Byrne and Hilbert (2007: 88-9; see also Byrne 2006) in effect answered as follows: (i) the chip is unique green, and not bluish-green; (ii) it looks unique green to Brit; (iii) it looks yellowish-green to Mitt. *Pace* Cohen, Byrne and Hilbert *have* answered the question. If the ostensible facts that some chips are determinate shades of green, that some chips look to be determinate shades of green, and that some determinate shades of

[21] Cohen actually uses the 'variant' terminology slightly differently to pick out "perceptual representations" (2009: 22) rather than perceivers.

green are incompatible, are problematic, this should be the result of an argument. No such argument is forthcoming.

If one starts with the naïve view, then, there seems little on offer from relationalists and relativists that might give one pause. And, as we will now discuss, relationalism and relativism have serious problems of their own.

3: Objections

This section presents some objections to relationalism. Similar objections apply to relativism—we will relegate brief discussion of (some of) these to footnotes. But first, relationalism needs to be spelled out a little further.

So far, we have been following Cohen's frequent usage in *The Red and the Real*, and have described the relationalist as holding that the chip looks unique-green-to-Brit-in-C to Brit, and yellowish-green-to-Mitt-in-C to Mitt. This makes for easy reading, but (as Cohen notes later) it is too simple. If the "circumstances C" are supposed to only include *environmental* parameters that influence color appearances (e.g. lighting, scene composition and viewing angle), then many other influencing factors have been left out, namely *perceiver* parameters such as the perceiver's state of adaptation. Suppose Brit's state of adaptation changes significantly, keeping her perceptual circumstances C fixed. The chip will look different to her—'It looks bluish-green', she might say. According to the relationalist, this change does not involve a color illusion: *another* relational property of the chip has been visually revealed to Brit. That relational property will involve a relation to Brit's new state of adaptation. And adaptation is not the only perceiver parameter, of course: Cohen mentions macular pigmentation and cone absorption spectra, among other things (2009: 29), to which we can add a long list of (largely unknown) neural factors. The upshot is that Brit drops out as a relatum, to be replaced by an n-tuple of perceiver parameters. That is, the schematic letter 'S' in the relationalist's locution 'red for S in C' should not be replaced by a simple expression denoting a perceiver (e.g. 'Brit') but rather by a complex expression specifying the values of (many) perceiver parameters. As Cohen puts it, "'S' is a schematic letter standing in for a relatively detailed specification of [the perceiver's] visual system, and 'C' is a schematic letter

standing in for a relatively detailed specification of the circumstance [the perceiver is] in at the time" (116).

There are mysteries here, however. How can we find out which parameters are included in S and C? Cohen offers some guidance:

> Colors should be construed as involving a relation to a parameter just in case, with all other factors fixed, a change in the relevant parameter can produce a difference in the colors things look to have to a given visual system (and there is no well-motivated, theory-independent reason for setting aside changes in that parameter). (43, fn. 24)

This clarifies the intention but it can't be quite right. Given a parameter, what is "held fixed" can't include anything that is later in the causal pathway that connects that parameter to the visual response, otherwise Cohen's test will deliver the result that colors do not involve relations to virtually any parameter. For example, if we hold the light reaching the eye from the scene fixed, then no other scene parameters will make a difference to the apparent colors of things.

In any case, the argument from variation inevitably leads to what we will call the $colors_F$—red-for-S-in-C, puce-for-S*-in-C*,…—being individuated in an extremely fine-grained way. The fact that parameters can offset each other provides a dramatic illustration. Given that Cohen says that a parameter should be included if it makes a difference to "the colors things look to have" holding the other factors fixed, there will be parameters for both overall illumination and the state of adaptation of the perceiver. A small increase in overall illumination can make a scene appear (transiently) brighter, but adaptation in the cones can counteract this effect with the net result that there is no change in color appearance. Although with just two parameters such a situation is unlikely, with the full set of parameters there will be realistic situations in which this sort of thing occurs. Since the parameters have changed, there should also be a change in "the colors [i.e. $colors_F$] things look to have", even though in the ordinary sense of that phrase, there isn't.

Suppose a parameter P affects color appearance, with different values of the parameter—P_1, P_2, P_3,…—resulting in different appearances. Consider a case of

interpersonal variation due to a difference in P: in perceiver A's situation the value of P is P_i, and in perceiver B's situation it is P_j, $i \neq j$. Schematically, the relationalist diagnosis is in two parts. First, that the "color properties represented" (Cohen 2009: 99) by the two perceivers' visual systems—that is, the $colors_F$—are different. A's visual system represents a certain relational property, *bearing R to…* P_i*…*, and B's represents the relational property *bearing R to…* P_j*…*, just like the previous property except that the relatum P_i is replaced by the relatum P_j. Second, the perceived object has both properties. Since the visual systems of A and B are sensitive to the value of P, they presumably register that value whenever they can. That is, if two perceptual situations differ in (at least) P, different $colors_F$ will be seen.[22]

We now turn to two groups of objections, the first related to perception and the second to language. Finally, after that, we will examine whether the relationalist can adequately explain the crucial locution 'color *c* for S in C'.

3.1 Perception

The $colors_F$ are individuated so finely that they rarely recur. Consider a bowl of fruit containing a mixture of bananas and oranges. Among the parameters in C will be ones specifying the distribution of reflectances in the scene. Swap a banana for an orange (or a banana for a riper banana) and the seen $color_F$ of each of the other pieces of fruit will be different since the circumstances have changed. Among the parameters in S will be ones specifying the state of adaptation of the perceiver. Look away from the bowl at a white wall for a few seconds and then back at the bowl. The seen $color_F$ of each piece of fruit will be different since the state of the perceiver's visual system will have changed. Any matches made across circumstances or adaptation states can't be $color_F$ matches since there are no $colors_F$ in common across changes in the parameters of the relation. Objects that look the same in color (in the intuitive sense) will—we may fairly conjecture—almost never share a $color_F$.

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[22] The parallel point for relativism is that if two perceptual situations differ in (at least) P, the $colors_F$ represented in both situations—which may be the *same* $colors_F$—will be instantiated relative to different parameters.

This multiplication of colors$_F$ is not, in itself, a problem. Perhaps there are very fine-grained shades of the familiar *colors* that rarely recur. What is problematic for relationalism is the commitment that we *see* these properties. Cohen acknowledges that many of the parameters that go into the colors$_F$ are not "cognitively" accessible:

> [T]here is good reason to doubt that, in general, we have cognitive access to all the different parameters that (on the relationalist view presented) need fixing. (114)

But there is equally good reason to doubt that they are *visually* accessible. Although each of the parameters is such that it can make a visual difference, there are so many parameters and they interact in such complicated ways that there is almost never any way for the visual system to recover (in theory or in practice) the values of most of them. This would seem to imply either that we don't visually represent such parameters or that, if we do, there is no particular reason to think that our visual representation of color$_F$ is veridical. Either way the colors$_F$ won't be capable of playing the role that relationalism requires.

A related problem is that the colors$_F$ are irrelevant to any of the explanatory tasks for which we normally appeal to the color content of vision. One way to see this is to consider a standard psychophysical experiment that involves subjects attempting to match two stimuli. As this is typically conceived, the subject's task is to determine whether two stimuli look the same or not. Alternatively, the subject is supposed to choose the most similar stimulus to some target. Behavior on tasks like this is determined by how things look to the subject (in the intuitive sense), and so not by which colors$_F$ are seen. The point is perfectly general: our behavior guided by color vision is sensitive to differences in color appearance (in the intuitive sense) and not to the very fine-grained differences in the colors$_F$ that our visual systems purportedly represent.

Another problem is that the colors$_F$ are ecologically insignificant. They are neither significant in their own right nor correlated (even locally) with interesting properties of objects. Colors can be useful in virtue of their local correlation with other properties of interest. You can learn that the tomatoes with the well-developed stripes and the slightly yellowish-green color are the tasty ones. But if you were to attend to the colors$_F$ of

tomatoes you would not be able to capture this generalization. Unless you bring with you a standard background and a calibrated light source for viewing the individual tomatoes, carefully control your state of adaptation, make sure that each tomato occupies the same visual angle, etc., the seen $color_F$ of tomatoes will be different on different occasions, in spite of the similar appearance. The relationalist may well be able to explain our behavior in these cases but it will involve adopting a much coarser categorization than the $colors_F$. It is thus obscure why we would have a visual system that represents the $colors_F$. Why go to the bother capturing this very fine-grained content if it doesn't enable visually guided behavior?

The $colors_F$, then, are invisible to the visual system, irrelevant to the explanation of behavior, and of no help in reproducing one's kind. What's more, there is a perhaps more fundamental worry. Suppose that, somehow, the visual system could recover the $colors_F$ of objects. Short of a miracle, this process could hardly be infallible. Even in perfectly ordinary circumstances involving "normal perceivers" one would expect errors to occur. For example, suppose the value of the illumination parameter in Brit's perceptual circumstance is λ. The chip she is looking at is (let us grant) unique green for S in $C(\ldots\lambda\ldots)$, where S is a detailed specification of Brit's visual system, and $C(\ldots\lambda\ldots)$ is a detailed specification of her perceptual circumstance, including the illumination-parameter value λ. We may further suppose that the mechanism that detects the illumination parameter misfires in Brit, resulting in her visual system representing the chip as being unique green for S in $C(\ldots\lambda^*\ldots)$, where $\lambda\neq\lambda^*$. Finally, we may suppose that the chip is *not*, in fact, unique green for S in $C(\ldots\lambda^*\ldots)$. (If someone were in state S and looked at the chip in circumstances $C(\ldots\lambda^*\ldots)$, the chip would not "look unique green".) *Thus there is no guarantee, even if relationalism is accepted, that Brit is veridically perceiving the chip*. The insistence on "faultless disagreement" is pointless, because it is a demand that cannot be met.[23]

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[23] Here is the parallel worry for relativism. In addition to the relativized property unique green (henceforth labeled '<u>unique green</u>' to distinguish it from the property labeled 'unique green' in English, which is plausibly a familiar *non*-relativized property) the relativist must countenance other color-like properties, whose relativized application conditions are slightly different from <u>unique green</u>. For the sake of a concrete example, let us work with a suggestion from Egan (2012: 311) and say that an object x is <u>unique green</u>

3.2 Language

At least there is some apparent *agreement* between Brit and Mitt. Surely they will share a belief about the color of the chip, a belief they would each express by saying 'The chip is green'. But are they really agreeing, according to the relationalist? The chip looks green-to-S_1-in-C to Brit, and green-to-S_2-in-C to Mitt, and it is a racing certainty that $S_1 \neq S_2$. So, if Brit (simply) believes that the chip is green-to-S_1-in-C and expresses this belief by saying 'The chip is green', then (since Mitt will believe and assert a different proposition), there is no agreement after all. Cohen emphasizes that this is unacceptable, saying that "the fine-grained properties are too fine-grained—too determinate—to be represented in our thought and talk" (114). Since the familiar *colors*—red, green, puce,…—*are* "represented in our thought and talk", the colors are *not* the $colors_F$. Surprisingly, the relationalist has not yet given us a theory of *color*.[24]

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relative to S and C iff x is disposed to look unique green to perceivers in S and C, where 'looks unique green' is understood as a phrase of ordinary English. (See also section 3.3 and note 31.) Then we may specify another relativized property, unique green*, as follows: x is unique green* relative to S and C iff x is disposed to look unique green to perceivers in S and C, except where the value of the illumination parameter in C (as specified on the left hand side) is λ, in which case x is unique green relative to S and C(…λ…) iff x is disposed to look unique green to a perceiver in S and C(…λ*…). Granted the existence of relativized properties, how would an object look if it looked unique green? The answer is unobvious, but clearly the relativist supposes it would "look unique green" in the ordinary sense of that phrase. How would an object look if it looked unique green*? Given the relativist's answer to the first question, the natural answer to the second question is the same: it would also look unique green, in the ordinary sense. Suppose the chip facing Brit is unique green relative to S and C(…λ…), and not unique green* relative to S and C(…λ*…). Now in order to represent an object as being unique green, the visual system somehow has to encode the appropriate kind of extreme sensitivity to the illumination parameter in C. Miracles aside, we may further suppose that something misfires in Brit, resulting in her representing the chip (which looks unique green to her) as unique green*, not unique green. Assuming that Brit's actual state and circumstances are the relevant ones for the purposes of evaluating her perception (see note 11), she counts as misperceiving the chip.

[24] The parallel difficulty for relativism is that a typical assertive utterance of 'The chip is green' appears to express an ordinary proposition that is true or false *simpliciter,* not a relativized proposition that is true only relative to S and C. Brit and Mitt plainly *agree* that the chip is green and *disagree* whether the chip is unique green, in the flat-footed non-relativist sense. The semantic data here are not puzzling in the way that

What are the colors, then? According to Cohen:

> [O]ur ordinary thought and talk about color attributes relatively coarse-grained relational properties to objects, and does so in a way that is context-sensitive. Specifically, I propose that the predicate 'is yellow' in [the sentence 'This ripe lemon is yellow'] as uttered in context K expresses the property *yellow for the perceivers relevant in context* K *under the perceptual circumstances relevant in context* K.… Likewise for other natural language color predicates. Moreover, I propose that the our ordinary mental (general cognitive) representation of colors works in a similar way, so that it ends up attributing the very same, typically coarser-grained properties to objects. Thus, when I perceive a ripe lemon, and thereby come to hold a belief in context K about its color—a belief to which I would normally give verbal expression (were I so inclined) by an utterance of ['This ripe lemon is yellow'] in context K—my belief attributes to the lemon the property *yellow for the perceivers relevant in context* K *under the perceptual circumstances relevant in context* K. *Mutatis mutandis* for thought about other colors. (100; cf. the discussion of McGinn in section 1.1)[25]

Call these "relatively coarse-grained relational properties" the $colors_C$. They are properties of this kind: *being* c *for the perceivers and circumstances relevant in context* K. Unlike the $colors_F$, the $colors_C$ will recur regularly and some of the generalizations that cannot be captured with the $colors_F$ will now be available. Most varieties of tomato are red_C when ripe, and stoplights and stop signs share that $color_C$. The chip confronting Britt and Mitt is

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they are in the case of epistemic modals, which for this reason are often supposed to be good candidates for a relativist treatment. (See, e.g., MacFarlane 2009.) In the notation of the previous note, the relativized color green is not the color green, and thus the relativist has not yet given us a theory of *color*. One relativist response is to adopt something like Cohen's account of color language, as described below, on which 'The chip is green' expresses an ordinary proposition.

[25] Recently Cohen has qualified this account: "Though this wasn't explicit in Cohen (2009), I have come to think that this contextualist semantics is best understood as a self-consciously revisionary proposal about how to hook overtly unrelativized color predicates onto the world, given the ontological inventory color relationalism is committed to (for reasons motivated by perceptual rather than linguistic phenomena)." (2015: 157, fn. 13). Of course that raises the question of what the *non*-revisionary semantics of color language is, which Cohen does not answer. For reasons of space we will not investigate this further.

green$_C$. It is not (or not obviously) the case that the visible colors$_C$ are behaviorally epiphenomenal. There is some hope, then, of identifying them with the familiar colors.

One problem concerns color vision in non-human animals. Suppose a macaque monkey is trained to associate pressing a yellow button with a food reward. Does the monkey know that pressing the *yellow* button brings food? It would seem so, since macaque color vision is very similar to ours. What is this property of the button just mentioned? It is the property expressed by 'yellow' in an ordinary context, which according to Cohen is something like yellow "*for normal perceivers in normal perceptual circumstances*" (121). It is presumably because a speaker in such a context has propositional attitudes (communicative intentions, for instance) concerning "normal perceivers" and "normal perceptual circumstances" that their utterance of 'yellow' expresses the color$_C$ *being yellow for normal perceivers in normal perceptual circumstances*. It is something of a puzzle how a languageless macaque, who is unlikely to have "normal perceivers" in mind, can believe that the button has this property.

Perhaps a more serious problem is that the introduction of the colors$_C$ threatens to undermine the initial motivation for relativism. Suppose that "John, an ordinary trichromat…sincerely and reflectively asserts [4] in…a more or less ordinary context" (119):

(4) Lemon *l* is unique yellow

According to Cohen, John's utterance of (4) expresses the proposition that *l* is "*unique yellow for a normal perceiver in normal perceptual circumstances*" (120).[26] Even before addressing the issue of what 'color *c* for S in C' is supposed to mean, exactly, it should be intuitively clear that, precisely because of variation in normal color vision, nothing is unique yellow for a normal perceiver in normal perceptual circumstances. John thus spoke falsely. (This is closely related to Brogaard's objection to "objective reflectance physicalism" mentioned in section 2.2 above.) To bring out the oddity of this, return to

[26] For the sake of uniformity, we have replaced Cohen's 'pure yellow' with 'unique yellow'. Note that something in the vicinity of Cohen's position on (4) is very plausible, given his starting point. Cf. "'Tomatoes are red', said without further ado, is interpreted as 'Tomatoes are red to normal people in normal circumstances'" (Jackson and Pargetter 1987: 74).

Brit and Mitt. It might have initially seemed that the relationalist's agreeably ecumenical descriptions of Brit and Mitt's situations are, respectively:

> The chip looks to be a certain determinate color to Brit, namely unique green, and it is that way. Thus she is right, perceptually and linguistically.

And:

> The chip looks to be a certain determinate color to Mitt, namely yellowish green, and it is that way. Thus he is right, perceptually and linguistically.

But this is incorrect. Rather, in an ordinary context the correct description of Brit's situation, according to the relationalist, is this:

> The chip looks to be a certain determinate color to Brit, namely unique green, but it is *not* that way. Thus she is *wrong*, perceptually and linguistically.

And similarly, mutatis mutandis, for Mitt. If you favor the first descriptions over the second then you need some other theory, not relationalism.[27]

We can go further. Although Cohen's terminology of "coarse and fine grained colors" (114) might suggest that colors_C and colors_F belong to the same family, perhaps related as determinables to their determinates, they are quite *different* sorts of properties.[28] The colors_C involve relations to perceiver types and perceptual circumstances of the sort that could be "relevant" to the participants in a conversation, while the second involve relations to the exotica of vision science. On the most natural way of spelling out the two sorts of relations, they don't even have the same adicity. Admittedly they are not wholly dissimilar, but if red, puce, scarlet and so on are colors_C, it is at least a stretch also to count the colors_F as colors.

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[27] Cohen suggests that in some contexts "mechanisms of accommodation could shrink the [relevant] class of perceivers and perceptual circumstances" (121), but that won't help in the present case. If we imagine the little speech just quoted is given in an ordinary context, then it will be unproblematically *true* (interpreting 'unique green' as *unique green for a normal perceiver in normal perceptual circumstances*) and so mechanisms of accommodation will not be triggered. (On accommodation, see Lewis 1979b.)

[28] Cohen notes that the colors_C are not determinables of the colors_F (2009: 110-1).

So the *only* sense, according to relationalism, in which Brit and Mitt are both correct is that their visual systems both "veridically represent" (Cohen 2009: 22) the chip as having different colors$_F$. But the colors$_F$ are poor candidates for *colors*, and anyway are not properties which we ordinarily talk about or believe that things have.

We now have to confess that our paper has been somewhat misleading up to this point. Bearing the relationalist account of the semantics of color vocabulary in mind, reread our introductory remarks before section 1. Here we are informally describing the issue in the way typically found in the writings of relationalists and relativists. The naïve view, we said, is rejected by relationalists and relativists. But, it turns out, that was much too hasty. According to the naïve view, tomatoes are red, emeralds are green, and redness and greenness are incompatible properties. Granted Cohen's semantics, that's true too. It's *also* true that the chip looks unique green to Brit and slightly yellowish-green to Mitt, and it can't be both. So, since 'looks' is clearly being used here (as throughout this paper) in a perceptual sense, the relationalist must admit that there is *perceptual disagreement* between Brit and Mitt about the colors of things. But wasn't that precisely the thing that relationalism was introduced to avoid? The relationalist will presumably reply that this sort of "perceptual disagreement" is not really *perceptual* disagreement in the relevant sense. Really it's a kind of linguistic disagreement, because the visual system serves up the colors$_F$, not the colors$_C$ (unique green, yellowish green, etc.). Even if this can be defended, we can now see that the relationalist's main claim about Brit and Mitt is perhaps a little *too* subtle.[29]

3.3 'red for S in C'

Finally, we come to the relationalist's technical expression 'color *c* for S in C'. We saw in section 1.1 that McGinn explains his similar piece of terminology in terms of the disposition to "look red". Cohen follows suit:

> I favor the view according to which *red for* S *in* C is the functional role of disposing its bearers to look red to S in C, and *green for* S *in* C is the functional

[29] The objection in this paragraph applies equally to relativism, since the relativist needs a non-relativist account of color language.

> role of disposing its bearers to look green to S in C. *Mutatis mutandis* for the other colors. (178)

That is: to be red for S in C is to be disposed to look red to S in C.[30,31] However, if 'look red to S in C' is interpreted as a schematic phrase of ordinary English, this cannot possibly be the right explanation of the technical expression 'red for S in C'. *Red for S in C* is a $color_F$, a property supposedly represented by our visual systems. *Looking red to S in C* is (on Cohen's view) something else entirely: it is not a property represented by our visual systems, hence is not a $color_F$, and in any case is defined in terms of $colors_C$ (the properties picked out by color vocabulary), which stand in just as much need of explanation as $colors_F$.

So, as Cohen says, "the natural next question is what it means to say that something looks red to S in C" (182). He answers as follows:

> x looks red to S in C just in case, by visually attending to x in C, S is appropriately caused (in C) to have an experience of red. (182)[32]

The natural next question is what it means to say that someone has an "experience of red". It is, Cohen says:

> …a type of mental state of subjects—namely, that type whose tokens are the (typical) effects of those subjects' attending to red things. Saying only this much, however, is bound to be unsatisfying. Beyond this, one might reasonably wonder what is the essential nature of the state type in question. Is the type constituted by its members' having a common functional or representational profile (Harman, 1990; Dretske, 1995; Tye, 1995), a common neural realization (Hill, 1991), a

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[30] There are some complications here, fortunately irrelevant for present purposes. See Cohen 2009: 220.

[31] The relativist's proprietary jargon is 'red relative to S and C' or, better, in the notation of note 23, 'red relative to S and C'. Egan (2012: 311) in effect explains this partly in terms of the disposition to "look red", like Cohen. Apart from the issue of how the relativist is understanding the ordinary English expression 'look red', there is the more fundamental issue of whether the relativist's apparatus of relativized propositions is intelligible in the first place.

[32] Note that here Cohen has switched back to using 'S' as a schematic letter for an expression referring to a perceiver (see the beginning of this section); we will follow suit.

> common irreducible phenomenological feel (Chalmers, 1996), or some other feature? I have not yet answered this question, and I do not wish to answer it. This is because I want the role functionalist theory of color that I have proposed to remain neutral on the important and controversial question of the metaphysics of color experience. (184)

This is unsatisfying, but not because the "essential nature" of the "experience of red" is left unspecified. The obvious candidate for the "type of mental state" that is the typical effect of "attending to red things" is the state of *having something look red to one*, and as we have seen this is not the state that Cohen needs. But the passage from Cohen does not clearly suggest another candidate.[33] Without more reassurance, there is no reason to suppose that there is such a "type of mental state". The relationalist's all-important locution 'Red for S in C' may turn out to stand for nothing.

[33] One possibility is to interpret 'experience of red' as 'experience of a certain phenomenological character' (see the quotation from McGinn on the Lockean assumption in section 1.1), where the relevant "phenomenological character" is supposed to be specifiable independently of the color red. But that faces familiar problems (see, e.g., Byrne and Hilbert 2011).

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