

WHAT COLORS COULD NOT BE: AN ARGUMENT FOR
COLOR PRIMITIVISM*

In “What Numbers Could Not Be,” Paul Benacerraf argues, famously, that numbers cannot be what many traditional logicians had hoped that they would turn out to be: particular sets.¹ The essence of the problem is that there are many distinct systems of sets that form progressions, and that forming a progression is all that a system of sets needs to do to serve as a basis for arithmetic. This paper offers a related argument for primitivism in the philosophy of color. Colors are irreducible properties of objects: properties that are presented in visual experience, and that stand in certain similarity relations in virtue of how they seem—or, to be more precise, in virtue of how they make objects that have them seem. There is no need to identify colors with any of the various physical or dispositional properties with which they happen, actually, to covary. Such identifications will end up endowing colors with properties they do not have and will commit us to the truth of counterfactuals to which we would do better to remain uncommitted. The conclusion is that the dispute between the various varieties of reductive color realism rests on a mistake.

I. STAGE SETTING: WHY NUMBERS ARE NOT SETS

The problem for a Fregean account of the numbers—an account that tries to construct them from the materials of some form of set theory—is that there are many progressions that can be so constructed. That is, there are many distinct systems of sets such that it is possible to pick out one set that functions as a zero, and to specify a successor relation between sets that guarantees a unique successor for each set. One such system might use the sets $\{\emptyset\}$, $\{\{\emptyset\}\}$, and $\{\{\{\emptyset\}\}\}$ to represent the numbers 1 through 3, while another might use the sets $\{\emptyset\}$, $\{\{\emptyset\}, \emptyset\}$, and $\{\{\{\emptyset\}, \emptyset\}, \{\{\emptyset\}, \emptyset\}\}$.² The abundance of such progressions is responsible for two embarrassments for those who wish to identify, in a strong way, the natural numbers with specific sets. The first embarrassment is that any choice between rival pro-

*Thanks to Michael Watkins and to Jonathan Cohen for comments on an earlier version.

¹Benacerraf, “What Numbers Could Not Be,” in Hilary Putnam and Benacerraf, eds., *Philosophy of Mathematics: Selected Readings* (New York: Cambridge, 1983), pp. 272–93.

²The definition of the successor relation for the first of these progressions is obvious. For the second, it is ‘ x is the power set of y ’.

gressions seems completely arbitrary. What could ground the truth of the claim that this progression, rather than that one is the “true” series of natural numbers? The second embarrassment is that, even after one has managed to convince oneself that one has identified a particular series of sets with the natural numbers, one will still be forced to give sense to certain questions about the numbers that do not seem very plausibly to have sense. For example, on the first progression given above, it turns out that 3 contains 2, but does not contain 1. On the second, however, 3 contains both 2 and 1. Does 3 contain 1, then, or does it not? In fact the correct answer to this question is that it is ill-posed, despite receiving two distinct and clear answers on the two systems described. One way of putting this problem is that if numbers are not actually sets then any view that wrongly identifies them with sets will also, at the same time, endow them with properties that they do not have.³

If numbers cannot be identified with sets, it might seem that they will need to be identified with some other sort of entity. A moment’s reflection, however, will reveal that precisely the same embarrassments lie in store for anyone who pursues this sort of line. But if numbers cannot be identified with any things at all, how can it be that there are any arithmetical truths? Benacerraf’s answer is Wittgensteinian in flavor. We learn to produce the counting numbers much as we learn the sequence of the alphabet, although in the case of the numbers we also learn a recursive procedure for generating them. Moreover, we also use these numbers to count collections of things, in order to answer questions about how many things there are in those collections. These two uses of number words yield a collection of truths about numbers (two comes after three; if a group contains five things then it contains more than three things) without any need to suppose that the number words are names for anything at all: or at any rate, for anything other than, precisely, numbers.

II. THE CASE OF COLOR

One might think that it would be hard to extend Benacerraf’s points about the numbers to the case of colors. Numbers, after all, are abstract entities if they are entities at all. Colors, on the other hand,

³ Benacerraf’s argument has, of course, been disputed. See, for example, N.P. White, “What Numbers Are,” *Synthese*, xxvii (May–June 1974): 111–24. But no one disputes that it has a great deal of initial plausibility. Primitivism about color, on the other hand, is decidedly a minority view. It is the point of this paper to increase its plausibility. For this reason, taking Benacerraf’s point as given should be regarded as dialectically permissible.

seem to be properties of physical objects, and some philosophers have thought that they were in fact physical properties.⁴ But the conclusion of Benacerraf's argument can be expressed in the following slogan: Numbers form an autonomous domain.⁵ This slogan is meant to suggest that arithmetical truths do not need to be explained in terms of anything other than the most basic truths about numbers: truths we learn when we learn to count out loud, and when we learn to count out how many objects are in a collection. The primitivist about color is making a similar claim: the central truths about color do not need to be explained in terms of anything outside of the domain of color. Of course this claim might be true even if some sort of *ontologically* reductive account were true, since we can separate out ontological and explanatory issues.⁶ But the color primitivist also holds that the reason why we cannot explain these central truths in a reductive way is that, ontologically, colors are primitive.

The claim that central truths about color do not need to be explained in terms of anything outside of the domain of color will initially strike many—especially advocates of reductive realist views of color—as quite obviously false. Are not various facts about reflectance properties, and the neurophysiology of the human visual system, crucial for a proper understanding of color? Are they not therefore facts that are outside the domain of color, but that explain truths about color? The answer to this challenge is: It depends on what one means by 'a proper understanding of color'. Normal people can certainly have color concepts without having any idea about the propagation of light. Nevertheless, a color scientist who does not know that there are three different color receptors in the normal human retina does not have a proper understanding of color—for a color scientist. But even before one becomes a color scientist, one typically has a complete mastery of color concepts. It is this sort of mastery that I am claiming involves the central truths about color, and does not depend on explanations offered in terms of anything outside of the domain of color. Of course, primitivism about color does not involve the de-

⁴ That *P* is a property of a physical object does not imply, of course, that *P* is a physical property. A mountain, for example, can be beautiful. And property dualists will hold that brains can have mental properties that are not physical properties.

⁵ In this connection, it is worth noting the title of one primitivist manifesto: Justin Broackes, "The Autonomy of Color," in Alex Byrne and David Hilbert, eds., *Readings on Color*, Volume 1 (Cambridge: MIT, 1997), pp. 191–225.

⁶ Such a separation is what allows for the positions advocated by Donald Davidson in his "Mental Events," in his *Essays on Actions and Events* (New York: Oxford, 1980), pp. 207–25; and Jerry Fodor in his "Special Sciences," *Synthese*, xxviii (October 1974): 97–115.

nial that there is much that science can teach us about the causes of color experience. Science might even teach us that nothing actually has the color properties presented to us in experience.⁷ The question is not whether science can teach us these things, but whether one of the things it can teach us is which properties, specified without the use of color terms, the colors actually turn out to be. The primitivist claims it cannot teach us this, because colors simply are not properties that can be so specified.⁸

It should be admitted immediately that the fact that people can have complete mastery of color concepts without knowing anything about the wave theory of light does not by itself show much, one way or the other, about whether the colors might be properly identified with physical or dispositional properties of surfaces, or properties of light. After all, it is possible to have complete mastery of the concept of water without knowing anything about chemistry. Nevertheless it remains exceedingly plausible that water is properly identified with H₂O. So, too, for all that has been argued so far, it might be that redness is properly identified with the possession of a spectral reflectance curve that falls within a certain set. However, if every suggestion as to the nature of redness should turn out to offer us a property that stands to redness in much the same way as the various sets mentioned above stand to the number 3, then it will be plausible to conclude that we need not—and probably should not—select any particular property at all as actually *being* redness. Rather, some other relation will obtain between the various candidate properties and redness. For example, those properties will turn out to be co-instantiated with the colors, and may turn out to share certain structural features with the colors. But such relations amount to something far short of identity.

There are, then, two models in terms of which we might understand the relation between color properties and the properties that reductive realists have identified with them. One model, advocated in

⁷ It might do this by showing that individual variation in color experience is so great that no sense can be attached to the claim that a specific object actually has a color. C.L. Hardin pushes this line very hard in many places. See, for example, his *Color for Philosophers: Unweaving the Rainbow*, expanded edition (Indianapolis: Hackett, 1993), pp. 76–77. I argue against such a view, and also against an overreaching color realism, in “A Realistic Colour Realism,” *Australasian Journal of Philosophy*, LXXXIV (December 2006): 565–89.

⁸ Of course in some sense color science *can* do this, since it can specify a particular color in the following way: ‘the color actual objects have when they have surface spectral reflectance so-and-so’. But this specification, according to the color primitivist, fails to inform us of anything unless we already know what colors are. So it fails in the task that reductive color realists take themselves to be engaged in: telling us what colors are.

this paper, makes the relation similar to that which obtains between the number 3 and the sets $\{\{\emptyset\}\}$ and $\{\{\{\emptyset\}, \emptyset\}, \{\{\emptyset\}, \emptyset\}, \emptyset\}$. The other model makes the relation similar to that which obtains between water and H_2O . How can we decide between these models? It might be useful to begin by pointing out one salient difference between the two models. Science has no alternative suggestion as to what water might be, if it is not H_2O . On the other hand, the two sets mentioned as candidates for being the number 3 are on an equal footing. Moreover, there are many other rival candidates. This difference between water and numbers at least favors the arithmetical model as a model for color. For there are a number of candidates for the property of redness that fill that role fairly well. Redness might be a surface spectral productance. Or it might be the highly disjunctive physical basis for that productance. Or it might be a disposition to stimulate the longer-wavelength receptors in a human eye to a degree greater than the middle-wavelength receptors. Or it might be a disposition to produce certain experiences in human beings under certain conditions.⁹ It is quite clear that these properties will yield coextensive classes of colored objects, at least in the actual world, and at least if it makes sense to talk about the extensions of color terms at all. After all, any object that has a surface spectral productance appropriate to redness will also have the disjunctive physical basis for that productance. Similarly, in determining that red things stimulate the longer-wavelength receptors to a greater degree than the middle-wavelength receptors, the criterion that has been used is that this ratio of stimulation is what produces a certain sort of experience. Thus this proposal will yield extensions for the color terms that are coextensive with those yielded by the fourth proposal. A similar argument goes for the first and third proposal, so that all four proposals can be seen to be extensionally equivalent.

On the other hand, there is a great deal of debate between advocates of various reductive realist positions. It must be admitted that the very existence of this debate represents an important disanalogy between reductive color realism and the position of a Fregean logicist.

⁹The first two of these proposals were offered by, respectively, Alex Byrne and David Hilbert, "Color Realism and Color Science," *Behavioral and Brain Sciences*, xxvi (February 2003): 3–21, 52–63; and J.J.C. Smart, "On Some Criticisms of a Physicalist Theory of Colors," in Byrne and Hilbert, eds., pp. 1–10. The third is suggested by some remarks by Byrne in his "Color and Similarity," *Philosophy and Phenomenological Research*, LXVI (May 2003): 641–65. The fourth is the Lockean position, advocated by Christopher Peacocke in his "Colour Concepts and Colour Experience," in Byrne and Hilbert, eds., pp. 51–65; and by Colin McGinn in his *The Subjective View* (New York: Oxford, 1983). McGinn no longer holds this view.

But what the preceding considerations about extensional equivalence do suggest is that it will be almost impossible for one kind of color realist to show that another kind of realist has failed to capture the proper extension. As a result, arguments between (for example) those who favor surface productances and those who favor the dispositional bases of those productances will turn on some other sort of consideration. An examination of the disputes between realists reveals that very often these considerations consist in the claim that the advocate of a rival view is attributing to colors some features that we do not think colors actually possess. And it is this sort of criticism that is exactly the sort that one logicist might level at another logicist who has offered a distinct proposal regarding which sets we should identify with the numbers. Such criticism, unless one can avoid it oneself, is consistent with the idea that it is simply a mistake to identify colors with anything outside the domain of the colors. That is, such criticisms, if they are both pervasive and generally correct, suggest that the characteristic error of nonprimitivist color realists is to identify colors with properties that themselves have or entail properties that we do not think colors possess. And the only alternative realist view is that of the primitivist.¹⁰

The following two sections of this paper fill out and support the above argument for color primitivism. The first presents primitivism in a nonmysterious way. The second shows that criticism of realist views does indeed often take the form suggested above, lending support to the idea that what is wrong with many reductive realist views may not be the realism, but the reductionism. In order for the strategy to succeed completely, one would have to show that every reductive realist position ascribes too many properties to the colors. That, obviously, is beyond the scope of this paper. But I do hope to show that reductive views that fall into certain broad classes—primary-quality accounts and dispositionalist accounts—have a tendency to overascribe. And I will argue that *any* sort of reductive view will give the colors too many modal properties.

¹⁰ If one is suspicious of primitivism, this may therefore lead one to some form of subjectivism or error-theory. I give a broad argument for realism—an argument that does not favor a reductive or primitivist version of realism—in “A Realistic Colour Realism.” For that reason I confine myself in this paper to arguments that presuppose some version of realism that validates the literal truth of such claims as ‘grass is green’. Thus I also do not discuss, in the present paper, versions of color realism that endorse a radical relativism about color properties. For one such a view, see Jonathan Cohen, “Color Properties and Color Ascriptions: A Relationalist Manifesto,” *Philosophical Review*, cxiii (October 2004): 451–506.

III. AN UNMYSTERIOUS PRIMITIVISM

Primitivist views of color have been offered by John Campbell, Colin McGinn, Michael Watkins, and—perhaps—by Justin Broackes.¹¹ But their arguments are typically negative, and can consequently leave one wondering.¹² Campbell, for example, seems primarily concerned to deflect certain criticisms of primitivism, rather than to explain in positive terms how we could possibly understand primitivism to be true. Similarly, McGinn's central thesis that colors only supervene on (without being identical to) dispositions to produce experiences of color is offered without any explanation whatsoever. Rather, his paper primarily argues that this thesis preserves what was right in his former dispositional theory without the liabilities. Yet, as Watkins rightly points out, "[s]upervenience claims do not explain; they require explanations."¹³ And the bulk of Broackes's paper is devoted to showing that colors can figure autonomously in certain kinds of laws. All of these views leave it rather mysterious how there could be *sui generis* properties of the sort that colors are claimed to be, and how we could ever take our phenomenal experience to inform us about them, or about when and where they are instantiated. That is, these views can leave one equating 'sui generis' with 'magical' and therefore as implying 'to be eliminated from our ontology'. And indeed there are some philosophers who hold that colors, as we understand them, really are *sui generis*, and that, as a consequence, we ought to be color eliminativists.¹⁴

We can begin to give an unmysterious primitivist account by drawing attention to the ostensive teaching of color terms, and to the role of phenomenal experience in such teaching. There can be no question but that color words—at least for the four primary colors—are taught ostensively when they are taught at all.¹⁵ And unless one is a skeptic about other minds, it is hardly more controversial that it is

¹¹ Campbell, "A Simple View of Color," in Byrne and Hilbert, eds., pp. 177–90; McGinn, "Another Look at Color," this JOURNAL, XCIII, 11 (November 1996): 537–53; Watkins, "Seeing Red: The Metaphysics of Colours without the Physics," *Australasian Journal of Philosophy*, LXXXIII (March 2005): 33–52; Broackes, "The Autonomy of Color."

¹² Watkins is an exception. It is his explicit project to show how colors, thought of as *sui generis* intrinsic properties of objects, might be causally responsible for experiences of color, even though they are distinct from the physical properties on which they supervene, and which also cause those same experiences.

¹³ Watkins, p. 43.

¹⁴ This seems to be the view of Paul Boghossian and David Velleman. See their "Color as a Secondary Property," *Mind*, xcVIII (January 1989): 81–103, and "Physicalist Theories of Color," *Philosophical Review*, c (January 1991): 67–106.

¹⁵ Some cultures have fewer than four basic color terms. See Brent Berlin and Paul Kay, *Basic Color Terms* (Berkeley: California UP, 1969).

essential to the correct learning of color words that one's phenomenal experience share—at least—certain structural features with that of other language learners. One might suppose that what is going on during such teaching is that color terms are given rigid physical referents, picked out by phenomenal experiences under certain circumstances, much as 'water' is given H_2O as a referent.¹⁶ This suggestion, given the use it makes of the notion of rigid designation, presupposes that there are correct answers to questions about the colors of objects under odd counterfactual circumstances: circumstances in which light behaves differently, or in which the atmosphere of the Earth absorbs light of certain wavelengths, or in which the human visual system is different. However, given the primarily practical uses of color words, there is no particular reason to think that even the most complete understanding of their meaning would determine what to say about such cases. That is, there is no particular reason to suppose that ostensive teaching, in the case of color terms, must cause such terms to pick out, rigidly, any physical property.¹⁷ Perhaps they do, but the above story about how such terms are taught and learnt itself provides no support for this hypothesis. And given that the hypothesis amounts to the assertion of the existence of a number of additional semantic rules governing relations between claims about color and claims about physical constitution, it seems clear where the burden of proof lies.

If color terms *do not rigidly* designate physical properties, this should not be taken to imply that they *do nonrigidly* designate them (perhaps under the description 'physical property picked out by this kind of ostensive teaching'). Such a view, which one might regard as a functionalist account of color, would also yield determinate answers to questions that, arguably, have none.¹⁸ It would just yield different answers than does the physicalist rigid-designation view. But if a physical surface property that might be used in our world to teach 'blue'

¹⁶ This seems to be Broackes's suggestion, which is why I only tentatively classify him as a color primitivist. See Broackes, p. 206.

¹⁷ Talk of rigid designation for predicates cannot be taken too strictly on analogy with similar talk regarding names for particulars. I take the claim that a predicate rigidly designates to indicate that its extension is not determined by the descriptions that competent speakers might associate with it, but by the most general description, of the appropriate sort (physical, psychological, biological), that *actually* picks out a large enough proportion of the sample used to fix the reference of the term. For a brief and illuminating discussion of the problems of uncritically extending talk of rigidity from particulars to kinds, see Scott Soames, *Philosophical Analysis in the Twentieth Century: Volume 2* (Princeton: University Press, 2003), pp. 423–56.

¹⁸ See Cohen, "Color: A Functionalist Proposal," *Philosophical Studies*, cxiii (March 2003): 1–42.

were used in some other world to teach a word that we would unhesitatingly translate as ‘yellow’, there is no reason to think that there is a fact of the matter as to whether or not surfaces with that property, in that world, are yellow, or blue.¹⁹ Whether we think of ostensive teaching as yielding a term that picks out a physical property rigidly, or nonrigidly—indeed, whether we think it picks out a physical property, a disposition, or a functional property—we will, in all cases, give color terms an intension that forces answers to questions about bizarre counterfactual cases. But, as will be argued below, there is reason to deny that a mere fixing of the physical facts is enough to underwrite the truth of any particular answer in such cases.²⁰

If what has been suggested so far is correct, then what we will need is a view that makes fewer counterfactual commitments than the various forms of reductive realism. Primitivism is such a view. According to primitivism, color words do indeed rigidly designate, but they rigidly designate colors rather than physical properties, dispositions, or functional properties. Part of what one learns when one learns the meanings of color words is to apply them to objects, based on visual inspection. This implies the existence of an appropriate link between phenomenal experiences and the use of such words. But that certainly does not mean that the meaning of a word such as ‘red’ is ‘such as to cause, in me, this particular phenomenal experience’ or ‘such as to cause, in normal people and normal viewing conditions, this particular phenomenal experience’. Rather, someone with a proper understanding of ‘red’ knows, without being able to articulate the details, that certain conditions are ones in which red objects will not produce their typical phenomenal experience. This additional knowledge, however, which can be viewed as a sort of practical ability, is by no means sufficient to determine how someone who had mastered ‘red’ would apply it to an object in a world stipulated to have different laws of nature, or in which human beings had slightly (or drastically) different optical equipment. That is, the meaning of ‘red’ does not yield answers to questions regarding the redness of objects in such worlds.

¹⁹ The possibility envisioned here is one in which people classify objects exactly as we do, with the exception of objects that have the surface property of this blue (as we call it) object.

²⁰ Evidently Frank Jackson shares something like this view regarding the kind of reference color words carry. See Byrne and Hilbert, “Color Primitivism,” *Erkenntnis*, LCVII (March 2007): 73–105, at p. 100. Mark Johnston, too, seems to hold that the meaning of color terms need not yield determinate verdicts in the relevant counterfactual cases. See his “How to Speak of the Colors,” in Byrne and Hilbert, eds., pp. 137–76, at p. 155.

To some philosophers it might seem to be a liability of primitivism that it avoids commitment to the truth or falsity of the peculiar counterfactuals that often crop up in discussions of the nature of color properties. Surely if colors are properties, then there is a fact of the matter as to the color of any particular object, no matter what odd sort of world it appears in. The right response to this worry is simply to deny the assumption that grounds it. Being made of wood is a property. We are realists about wood. And yet if we imagine strange enough possible worlds we can easily come up with substances about which the best thing to say is that it is indeterminate whether or not they are made of wood. For example, we can imagine a treeless world in which a substance exactly like wood, used for houses and furniture and so on, is produced by tiny marine organisms, like coral. Is this a world in which wood is produced like coral, or a world in which there is no wood? There is no nonstipulative answer to this question. The same is true for possible worlds in which objects with the same primary qualities as red objects reflect light in a pattern characteristic of actual blue objects into the eyes of human beings whose resulting phenomenal experiences are like our experiences of yellow. What color are such objects? The point is not merely that there is disagreement among normal people, or among philosophers. Rather, it is that color concepts, like concepts of other secondary qualities but unlike those of primary qualities, have their extensions determined by the responses of human beings. When those responses fail to determine a fact of the matter, there is no fact of the matter to be determined, because there is nothing else, even in principle, to determine it.²¹ And what goes for extension here goes equally for intension.

The primitivist position, despite its refusal to make certain pronouncements as to the colors of objects in odd counterfactual circumstances, does not prevent us from using color properties in our descriptions of possible worlds: even the odd possible worlds that so often figure in the internal disputes between advocates of the various forms of reductive realism. For even though 'orange' is not a rigid designator for a property that we can describe in nonchromatic terms, it is still the name of a property. Consequently, we can use it in describing a possible world in which grass is orange. What do we know about such a world? One thing we know is that the grass is yellowish and

²¹ Similar remarks have been made, for similar reasons, regarding evaluative concepts. See Hilary Putnam, *The Collapse of the Fact/Value Distinction* (Cambridge: Harvard, 2002), pp. 108–09. See also Crispin Wright, *Truth and Objectivity* (Cambridge: Harvard, 1992); Michael Smith, *The Moral Problem* (Cambridge: Blackwell, 1994); Frank Jackson, *From Metaphysics to Ethics* (New York: Oxford, 1998).

reddish, and that it is not green. Also, given plausible assumptions about the supervenience of colors on the physical (including the physical nature of human beings), we know that if the laws of nature are the same in that world as they are in ours, and if human beings have visual equipment pretty much like ours, and if the environment in which humans live is like our environment in terms of ambient light, then grass appears orange to human beings there. What this suggests is that the lack of a truth value for claims about the colors of objects in odd counterfactual circumstances need not be the result of any incompleteness of meaning for color terms. Rather, the lack of truth value is the result of an underspecification of the relevant world, much as Saul Kripke's "purely qualitative descriptions" of the world cannot tell us whether or not a certain person in that world is Nixon.²²

So far in this section I have tried to provide an account of the meanings of color words that fits a primitivist realist position, but not a reductive realist position. My strategy has been, in essence, simply to draw attention to relatively uncontroversial facts about the teaching and learning—and hence the meaning—of color words. Mastery of such words—of their meaning—primarily involves the ability to apply such words to objects in this world based on visual experience.²³ It also involves the ability to apply them to objects in a limited class of nearby worlds based on regularities that hold in this world, and to distant worlds based on stipulation: we can say that the meat would have been red in the center if it had been cooked less, and that if angels all have bluish eyes then none of them have yellowish ones. There is no reason to suppose that the meanings of color words determine what is right to say about the colors of objects in odd counterfactual circumstances, even when we specify all the facts that *would* serve to determine the color, were any of the various forms of reductive realism true. Primitivism about color allows us to ask the full range of questions of the following sort: 'What if human beings all saw red things as green?', 'What if objects with such-and-so surface properties (which in the

²² Kripke, *Naming and Necessity* (Cambridge: Harvard, 1980), pp. 43–46. Kripke allows that other, *nondescriptive* features of a world might allow us to infer that a particular person is, or is not, Nixon. But the parallel claim is also true for colors: if we know that an object is bluish, for example, we know it is not yellowish. The present point is only the uncontroversial one that the descriptions we offer of possible worlds—purely qualitative or not—can easily underdetermine various further facts about those worlds.

²³ Michael Watkins's position, according to which properties are individuated by causal powers, and according to which the causal powers of colors are limited to those involving the production of color experiences, is something like the ontological image of this semantic view. On Watkins's view, however, we cannot consistently talk about worlds in which colors contribute different causal powers than those they actually contribute. This seems to me a liability of his position.

actual world are responsible for its being red) were green?’, and ‘What if red objects reflected light in such-and-so pattern (which in the actual world is characteristic of green things)?’ Reductive realists must always regard one such question as nonsensical. But given that every other reductive realist—as well as the primitivist—will give sense to that question, each denial of sense to a particular question should seem dogmatic.²⁴ This strongly suggests that all forms of reductive realism unnecessarily precisify (and thus misrepresent) the meanings of color words.

A question that will naturally occur to the critic of primitivism at this point is ‘Why doesn’t all the foregoing argument apply equally well to *all* property words?’ First, it should be admitted that we learn shape words partly by means of ostension. There may well be approximately the same number of children’s books that teach shape words by means of pictures of shapes as there are that teach color words by means of color patches. Moreover, it is also true that competence with the word ‘square’ involves an understanding that there is a difference between ‘square’ and ‘appears square’, and therefore an implicit understanding that some conditions are such that one cannot correctly apply the word ‘square’ simply on the basis of the square appearance of an object. In these ways an understanding of shape words is similar to an understanding of color words. However, in the case of squareness there are also other necessary conditions that one learns as part of learning the meaning of ‘square’. For example, squares of the same size must be able to fit together in a grid. Also, all the sides of a square must be the same length, and we have many methods for determining sameness of length. Given the practical purposes of shape words (getting things to fit together, for example), it is not a surprise that these sorts of nonperceptual tests for squareness have a kind of priority over mere visual appearance. As a result, we can construct counterfactual situations in which we have enough information to know that these additional tests would (or would not) yield a verdict of ‘square’. Thus, we can know, regarding these counterfactual situations, which objects are (or are not) square. And this remains true even if we describe such possible situations without making any use of shape words, and even if we stipulate that there are no human beings around: indeed, even if we stipulate that the only human beings

²⁴ The argument is therefore similar to one from symmetry, but with this difference. In an argument from symmetry, it would matter if there were some small asymmetry that gave one position an advantage. But in the present case (a) every reductive realist is outvoted by an impressive majority in at least one case, and (b) the primitivist is not outvoted in any case.

around have systematic problems with visual shape-perception. Interestingly, if we describe possible worlds in which our canonical tests cannot be applied, we *do* get an underdetermination analogous to that in the case of color.²⁵ In such cases, the question of whether or not a certain four-sided object counts as square will either be a matter for stipulation, or will be as nonsensical as the question of whether a certain velocity is red.

Unlike shape words, color words are applied to actual objects based on nothing but chromatic experience and a practical grasp on what counts as normal conditions. Even applications of color words based on memory, the testimony of others, or the output of a mechanical color-detector all “bottom out” in the verdicts of competent human judges who use nothing but their eyes to determine the colors of objects. That is, a mechanical color-detector has no authority of its own: it must initially be calibrated by comparison with a competent human judge. Even the most hard-nosed productance physicalist has no other option in determining what set of surface productances constitutes redness. Relatedly, color memory only has authority in virtue of the fact that it gets things right by the direct criterion. On the other hand, we can easily imagine a machine whose output might call into question our ability to judge squareness correctly by vision alone.

IV. THE PROBLEM WITH REDUCTIVE COLOR REALISM

In “How to Speak of the Colors,” Mark Johnston lists five core beliefs about color, and argues that no coherent view of color seems likely to preserve them all.²⁶ In defending this claim Johnson criticizes both primary and secondary quality accounts of color. In this section, I first explain how it is that primitivism avoids a tension that Johnston regards as entirely internal to the five core beliefs: that is, a tension that he does not think depends on any particular realist assumptions. What I hope to show is that the tension does in fact depend on a certain assumption: the assumption that distinguishes nonprimitivist from primitivist views. Inasmuch as the tension is both worrisome and avoidable, this argues in favor of a primitivist version of realism. I then explain how Johnston’s criticisms of both primary and secondary quality accounts of the colors have the same source as Benacerraf’s

²⁵ This is part of the point of Ludwig Wittgenstein’s thought experiment in which measuring or weighing things does not yield consistent results. See Wittgenstein, *Philosophical Investigations* (New York: Macmillan, 1953), §142.

²⁶ The distinction between core beliefs about a subject and peripheral beliefs involves the idea that to give up a core belief is to give up the idea that one knew what one was talking about. Of course it can be a matter of controversy whether a belief counts as a core belief or not. See Johnston, p. 137.

criticism of set-theoretic definitions of the natural numbers. In particular, these accounts ascribe too many properties to the target of analysis. For each sort of reductive color realism, the attribution of these extra properties stems from the fact that the accounts identify the colors with something putatively more basic, just as the logicist tried to identify the natural numbers with particular sets.²⁷ The pervasiveness of this “overascription” problem again argues in favor of primitivism.

A Tension in the Core Beliefs. Here are the five core beliefs that Johnston begins with. He presents them in terms of one particular color—canary yellow—and I will follow him in this.

Paradigms: Some of the paradigms of CY (canary yellow) are really CY.

Explanation: Sometimes something’s being CY explains why it looks CY.

Unity: CY has a unique location in the space of similarity/exclusion relations for the various determinate shades.

Perceptual Availability: One can form justified beliefs about the CY-ness of an object on the basis of visual perception.

Revelation: The intrinsic nature of CY is fully revealed in an experience as of something CY.

Johnston claims that there is an immediate tension among these beliefs. If this is right, then the charge of failing to account for all of the beliefs will not be devastating to reductionist—or any other—views. After all, no view can be expected to account for the truth of a set of inconsistent beliefs. The tension Johnston is concerned with is the following: Revelation cannot be true if Explanation is, given what we know about the potential explanatory causes of color experience. For visual experience does not reveal the nature of these potential causes, much less which of them is the real cause.²⁸ Visual experience does not even tell us that information about colors is conveyed through space by light. It is partly this tension, and the resulting putative inability of *any* account to preserve the five core beliefs, that motivates Johnston to make his revisionary suggestion that we need to give up Revelation in the following way: CY is a disposition, but an

²⁷ Boghossian and Velleman offer similar arguments against both sorts of reductive accounts. See their “Colour as a Secondary Quality,” and “Physicalist Theories of Color,” both reprinted in Byrne and Hilbert, eds., pp. 81–103, and pp. 105–36. Rather than opting for Johnston’s revisionary dispositionalism, Boghossian and Velleman advocate an error theory according to which we mistakenly attribute to objects properties that belong only to visual experience.

²⁸ Johnston, pp. 139–40.

experience as of something CY does not reveal this fact about its intrinsic nature.

Johnston's arguments make use of a relatively strong version of Revelation: a stronger version than we need accept. Moreover, since Johnston's version of Revelation conflicts obviously and immediately with reductionist accounts of all sorts, it is to be expected that advocates of such accounts will reject it. Further, Johnston's Revelation is a controversial thesis: indeed, it is somewhat controversial what precisely it amounts to. For all of these reasons, I want to present a weaker version of Revelation that I think is true. This weaker version will ultimately yield the same anti-reductionist implications as the stronger version. So perhaps reductionists will simply reject it. But since it is weaker, it should be harder to reject. My version is also sufficiently strong that Johnston will still advocate a view that violates it. That primitivism need not violate it is therefore something in its favor. The version of Revelation I endorse is the following.

Modest Revelation: A complete understanding of what CY is can be given by an experience as of something CY, in someone with normal human vision who has already acquired color concepts.²⁹

This view implies and is implied by what seems to be true: that if someone has normal human vision, and knows how to use color vocabulary, then we can explain what CY is to that person completely simply by showing her something that is CY and saying that the color of the object is CY. This simple instruction is all that is needed to give

²⁹ Modest Revelation does not make use of the phrase 'intrinsic nature', since it seems that intrinsic nature is not what Revelation is about, at least if intrinsic nature and extrinsic nature are meant to be exclusive and exhaustive. For something (a brick) might, as a matter of fact, be part of the intrinsic nature of something else (a house), and yet be only contingently so. I think proponents of Revelation are in fact concerned with *essential* nature, which cannot be contingent, and which I indicate with the less technical phrase 'what CY is'. It may be useful to compare Modest Revelation with the following passage from Wittgenstein:

the ostensive definition explains the use—the meaning—of the word when the overall role of the word in the language is clear. Thus if I know that someone means to explain a color-word to me the ostensive definition 'That is called "sepia"' will help me to understand the word (*Philosophical Investigations*, §30).

The similarity suggests Modest Revelation will not fall foul of Wittgensteinian considerations having to do with the nature of concept possession and its normative aspects. This is a danger that stronger versions of Revelation seem to ignore. Indeed, standard versions of Revelation seem to suggest that babies, apes, and dogs have full knowledge of the nature of the colors they see. But, to borrow again from Wittgenstein, "looking does not teach us anything about the concepts of colours" (*Remarks on Colour*, G.E.M. Anscombe, ed., L. McAlister and M. Schättle, trans. (Berkeley: California UP, 1978), Part I, §72).

her complete competence with the term ‘CY’. Moreover, the same capacities that underlie the efficacy of this simple method of instruction would also allow our subject to coin her own term when observing a CY object: a term that meant the same as ‘CY’.

Modest Revelation is considerably weaker than Revelation. But for that reason it is much more plausible. One way it is weaker is that its scope is restricted to people who have already acquired color concepts and who can therefore be understood to be “paying attention to the color” of an object when it is shown to them. This makes it far more plausible that they can learn about the nature of a particular color via an experience of that color. Advocates of the stronger version of Revelation seem to think that we are simply born with the notion of a color, and only want acquaintance with colored objects to know *which* colors there are.³⁰ The further restriction to people with normal vision is warranted for the following reason. Consider Bob, who is red/green color blind. Bob, looking at a yellow object that does not seem reddish or greenish even to someone with normal vision, may well have an experience of that object that is phenomenally indistinguishable from the normal experience.³¹ And yet, given that Bob cannot reliably distinguish yellow objects from many nonyellow ones, it seems wrong to say that the experience he has when looking at the unique yellow object reveals to him what unique yellowness is.

Certainly Modest Revelation is in tension with the claim that CY is a disjunctive physical surface property, or a set of surface spectral reflectances. In general, it is in tension with the claim that CY is any property that, as a matter of fact, causes, via the propagation of light, experiences of CY. But this point only makes Modest Revelation inconsistent with Explanation if we hold that the only account of the way in which colors explain color experiences must be given in terms of the propagation of light, the absorption of photons by photopigments, electrochemical interactions between neurons, and so on. But all that Explanation actually claims—and all that it should claim, if it is to count as a core belief—is that sometimes something’s being CY explains why it looks CY. There are many forms of explanation other

³⁰ My very small friend Ben Carens seems to me to have falsified this supposition. When he was first learning color words and had only got as far as red, yellow, blue, and green, I showed him an orange object and asked its color. His answer: “No color.”

³¹ As many have suggested, it is problematic to talk about interpersonal indistinguishability of phenomenal states. But those who endorse a strong version of Revelation seem to assume that it is “the particular phenomenal quality” given in an experience of CY that reveals the nature of CY. So, in arguing that their version of Revelation is too strong, it is legitimate to make use of the assumption that we can talk about particular phenomenal qualities in this way.

than those that appeal to the basic laws of physics. Thus, knowing what CY is does not entail, even if Explanation is true, that one knows that CY is a microphysical surface property. There are many forms of explanation that have a legitimate claim to be called causal explanations: perhaps psychological explanations count as causal, and appeals to the gross shapes of objects certainly seem to provide causal explanations for the behavior of those objects without any appeal to microphysics. What matters in all such cases is the existence of the right sort of counterfactual-supporting law-like generalizations. Primitivism can take advantage of this fact to avoid the tension Johnston describes. For on a primitivist account of color, it remains true that the colors of objects explain, at least quite often, why those objects appear to have the colors they do.³² Admittedly, one's current visual experience may in principle be explained by reference to the propagation of light, the functioning of one's eyes and optic nerves, and one's brain. No mention of color need enter into such an explanation. Let us grant this. But in fact the relevant question is not 'What is the explanation of my current visual experience?' Rather, it is 'What explains why I am having an experience of CY?' True, my current experience happens to be one of CY. And, we are assuming, we can explain how my current experience is caused without reference to the property of being CY. But this does not mean that we have an explanation of why I am currently having an experience in which something looks CY.³³ Explanatory contexts, like epistemic contexts, are opaque. Assume for the moment that the event that consists in my saying 'No' in response to some proposal can be explained in terms of physical processes originating in the utterance of the proposal and terminating with the contracting of certain muscles in my mouth, lips, and tongue. Such an explanation would not address the question of why I rejected the proposal, even if (let us grant) the event *was* my rejection of the proposal. A purely physical explanation of my current experience (as I look at a CY object in good light) is simply not an explanation of why I am having an experience *of* CY.

³² See Campbell, pp. 182–84, and Broackes, pp. 192–94, for more detailed development of this same point.

³³ Gabriele De Anna, in defending the primitivist position, ignores this point in a revealing way. He offers the critic of primitivism a sort of translation of the claim that the red of an apple caused the red of a patch on a photo: a translation that does not mention colors at all. But in fact De Anna's translation does not really manage to omit reference to colors: rather, it conceals it a footnote that contains the following text: "[t]he relevant similarity here is one which allows both *s'* and *s''* to be considered experiences of red." See De Anna, "The Simple View of Colours and the Reference of Perceptual Terms," *Philosophy*, LXXVII (January 2002): 87–108, at p. 99.

Suppose we bracket the above concern, and grant that we could have a physical explanation of my experience of CY. To see why such an explanation would still not be as good as the primitivist explanation, consider the following question. If the surface had been physically different, even radically so, would this entail that my experience would not have been an experience of CY? No. Very different surface properties—indeed, very different reflectance properties—can easily give rise to the same phenomenal experience. On the other hand, had the object not been CY, it is unlikely I would have had an experience of CY. This suggests that it is the property of being CY that will figure in the kinds of regularities characteristic of causal explanations.³⁴ So primitivism allows us to claim both that the color of an object often explains why it looks the way it looks, and that the nature of particular colors can be fully revealed, to those competent with color concepts, in experiences of those colors. Nonprimitivist realist views cannot underwrite both of these claims. This makes the charge of failure to account for the five beliefs more damaging to nonprimitivist views, and argues in favor of primitivism.

Primary Quality Accounts: Too Many Dimensions of Similarity. Let us now turn to Johnston's criticism of primary-quality accounts of color. The argument proceeds in two stages.³⁵ First, Unity requires that CY have its unique location in color similarity space: it should be more like other shades of yellow than it is like any shade of blue, and so on. But on the primary quality account, these relations are going to be a matter of scientific discovery about similarities between massively disjunctive primary qualities. This, however, is inconsistent with the fact that we knew all about color similarities before science told us anything of this sort. So colors cannot be primary qualities.³⁶ Thus ends the first stage of the argument. The second stage starts from a potential reply to the conclusion of the first stage. Might it not be, according to the reply, that the familiar relations—the ones we knew before science told us anything about the colors—function as *a priori* conditions that will constrain the properties that science could discover to be the colors? That is, science must look for properties such that CY is more similar, in terms of those properties, to other shades of yellow than it is to any shade of blue. But Johnston convincingly argues that with this stipulation we give up the idea that we know if

³⁴ Byrne and Hilbert make these and related points on behalf of the primitivist in their paper criticizing primitivism. See Byrne and Hilbert, "Color Primitivism." Watkins also provides a very nice explanation of the same point in "Seeing Red," pp. 47–48.

³⁵ Johnston, pp. 149–50.

³⁶ See also Hardin, p. 66.

there are really any CY objects at all. For science would need to show that there really is a primary quality that bears the right sort of similarity relations to other colors. And, for all we know, there is no such primary quality. The real possibility that there might not turn out to be any CY objects violates Availability. Thus, the primary quality account—adjusted to meet Unity—violates Availability.

One might try to avoid this problem by claiming that there could be more than one conceptually independent but noncontingent description of the colors: one in terms of location in similarity space, and another in terms of primary qualities. A model from another domain might be 'H₂O' and 'the actual watery stuff'.³⁷ That would allow us to know that a certain object was CY, simply by knowing about its visual similarity relations, even if we did not know anything about its microphysical surface properties, and even if no such properties had the same similarity relations. The problem with this proposal is that Unity is meant—plausibly—to be a necessary truth. For it does not seem possible for orange to be visually more similar to blue than to either yellow or red. But if orange is supposed to be a certain microphysical property, we are forced to give up the idea that something orange must appear more similar to something red than to something blue.

The conflict between Unity and Availability might not seem to be the result of the attribution of too many properties to the colors. But in fact that is one way of viewing the source of the problem. If colors are actually microphysical properties—disjunctive and messy or simple and unified—then they will stand in various microphysical similarity relations to which we have no access except via quite advanced scientific techniques. That is, on the physicalist account it might turn out that a certain shade of blue is actually more similar to a certain shade of yellow than to any other shade of blue. This is because the physicalist gives colors many more dimensions of similarity to other colors than any normal person would typically be willing to grant. For the only similarities that normal people attribute to colors are visual similarities: similarities in hue, saturation, brightness, and so on. The extra dimensions of similarity that the physicalist imports are like the extra relations that the logicist mistakenly gave to the natural numbers: membership relations to each other. The proper response is to deny that colors have any microphysical similarity relations. And this is to deny that colors are in fact to be identified with microphysical properties.

³⁷ I owe this objection to Cohen.

Dispositional Accounts: Too Many Relata. Johnston next criticizes dispositional accounts of the colors. Here it is Revelation that does the bulk of the work. For the relevant dispositions are relational properties: they are dispositions to cause certain experiences in a certain sort of being in certain circumstances. But, Johnston argues, most colors do not appear to be relational. There are perhaps certain exceptions. The highlights on a shiny object may change and shift as one moves in relation to the light source, and this may make the relativity to circumstances phenomenally apparent. But many colored objects simply appear to have a steady color that does not vary except with very drastic changes in the light. Again, this failure of an account of color to meet one of Johnston's five core beliefs might not immediately seem to be the result of the fact that the account attributes too many properties to the colors. But, again, the source of the problem is exactly this. For the failure of Revelation for *any* account of color is typically explained in the following way: on that particular account of color, the color of a particular object has certain essential properties, but those properties are not fully revealed by the chromatic aspects of an experience of that object. In the case of dispositional accounts, the color of a particular object has a number of relata that are not revealed in experience. The general moral here is that any failure of an account in terms of Revelation—or Modest Revelation—can often naturally be put in terms of that account's ascribing too many properties or relations to the colors. Indeed, if an account of the colors makes it essential to a particular color that it have *any* properties or relations that an experience of that color would not reveal to those competent with color concepts, that account will be inconsistent with Modest Revelation. So Johnston's criticisms, to the degree that they can be made to rely on Modest Revelation, can easily be understood as a general indictment of all nonprimitivist realistic accounts of color. That is, it can be understood on the model of a general indictment of set-theoretic reductions of the natural numbers that go as far as to claim that the numbers are nothing but the sets that the account identifies with them. Just as the Fregean account allowed for answers to such ill-posed questions as 'How many members does five have?', so too does the dispositional account of color allow for an answer to the ill-posed question 'Relative to what viewers does that object have the color it appears to you to have?'³⁸ This question is ill-posed be-

³⁸ This question is quite different from the following: 'What viewers have the same phenomenal experience as you do, when looking at the object?' For even if two viewers have the same phenomenal experience, the dispositional theory cannot say that those viewers see them as having the same color. The reason for this is that, even assuming

cause no class of viewers appears, even obliquely, in the content of chromatic experience.³⁹ This objection might also form the basis of an objection to relationalist views such as those of Jonathan Cohen and Brian McLaughlin. On their view, claims such as ‘That apple is green’ are much like the claim ‘That refrigerator is too heavy to lift’. The latter claim conceals a reference to some individual or class for whom the refrigerator is too heavy, and Cohen and McLaughlin hold that a similar reference is part of the content of the former claim.⁴⁰ By itself this view does not offend against Revelation. But if Cohen and McLaughlin think that such common color claims serve to express even part of the content of visual experience—if they think, that is, that part of the content of a visual experience might be ‘there is a red object near a green object’—then they are committed to a view that is incompatible with Modest Revelation.

All Reductive Realist Accounts: Too Many Modal Properties. In a recent argument against primitivism, reflectance physicalists Alex Byrne and David Hilbert begin by assuming that the primitivist must choose one of two ways to explain the connection between colors and reflectances.⁴¹ The primitivist must say, according to Byrne and Hilbert, either that colors are nomologically coextensive with reflectance types, or that, for any color, there is some reflectance type that metaphysically necessitates that color. One essential difference between these two explanations is that the former makes the connection contingent, since laws can change from world to world, while the latter makes the connection necessary. Colin McGinn is a representative primitivist who embraces the nomological understanding of the connection. According to McGinn, if the laws of nature in some other possible world result in its being the case that ripe tomatoes

that the relevant viewing conditions *C* are identical in ‘CY-for-humans-in-*C*’ and ‘CY-for-Martians-in-*C*’, these two dispositional properties clearly are not identical, and need not be coextensive. Thus, even if a certain object *O* has both of these properties, the fact that you and a Martian have the same phenomenal experience when looking at *O* does not mean that, relative to Martians, *O* has the color property it appears to you to have. Compare John Hyman, “What, if Anything, Are Colours Relative to?” *Philosophy*, LXXX (October 2005): 475–94, at p. 486.

³⁹ Some sorts of relativity might be part of the content of visual experience: for example, the blueness of a certain object might appear bright relative to that of another object, but dim relative to that of a third. But this sort of relativity does not speak against Modest Revelation, since it is actually manifested in visual experience.

⁴⁰ McLaughlin, “The Place of Colour in Nature,” in D. Heyer and R. Mausfeld, eds., *Colour Perception: Mind and the Physical World* (New York: Oxford, 2003), pp. 475–502; Cohen, “Color Properties and Color Ascriptions”; Sydney Shoemaker, “Phenomenal Character,” in Byrne and Hilbert, eds., pp. 227–45, at p. 234.

⁴¹ Byrne and Hilbert, “Color Primitivism,” pp. 75–76.

produce color experiences quite different from the experiences they produce in this world, then in that world ripe tomatoes would not be red, even if they reflected light in precisely the same way. I do not know of any primitivist who explicitly advocates the other, metaphysical understanding of the connection between colors and reflectances. But such an advocate would have to claim that the tomatoes in the previous example, if they really reflected light in the same way, would remain red no matter how they appeared to people in some other possible world.

We should note, before going on to discuss the relative merits of these two options for the primitivist, that it is not only primitivists who have a choice here. Any reductive realist will identify colors with some features of colored surfaces. Those features may simply be reflectance types, in which case the metaphysical version of the explanation of the connection between colors and reflectances will be true. Or the features may be the highly disjunctive physical properties of surfaces that give rise to facts about reflectances, in which case a red object in another possible world might have a different reflectance, since the laws of the propagation of light might be different in that world. In that case the nomological version of the connection between colors and reflectances will be true. All other reductive views have similar implications. As a result, reductive realists are in a more tightly constrained position than primitivists here. They cannot avoid endorsing one of the two understandings of the connection between reflectances and colors, because their views as to the nature of color will force that endorsement. This is because all the distinct reduction bases for the colors that are not metaphysically coextensive are nomologically coextensive. To make this clearer, imagine that the various potential reduction bases for redness are *A*-ness, *B*-ness, *C*-ness, and so on, and that none of these reduction bases is metaphysically coextensive with any other: their coextensiveness is nomological. If redness simply is *A*-ness, then redness and *A*-ness are metaphysically coextensive because they are identical, while redness and *B*-ness, *C*-ness, and so on, are nomologically coextensive, because *A*-ness (which is redness) is nomologically coextensive with all the other potential reduction bases. All plausible claims of the form 'Redness is coextensive with *X*-ness' will, therefore, be either nomologically or metaphysically necessary.

There is no need here to discuss the details of the argument that Byrne and Hilbert mount against the primitivist. For the central point of this section is that we can reject the very first premise of that argument: primitivists, contrary to what Byrne and Hilbert assume, need not make any choice between the two explanations offered to them. That is, the primitivist need say neither that redness is meta-

physically necessarily coextensive with a particular reflectance type, nor that redness is nomologically coextensive with that reflectance type. By this I mean the strong claim that the primitivist can simultaneously deny both explanations of coextensiveness—not merely that the primitivist can withhold judgment until the facts are in, or deny either as long as he endorses the other. This does not mean that the primitivist must deny both explanations. Rather, either choice remains open to the primitivist, so that if an argument should emerge that decisively favors the metaphysical account, for example, over the nomological account, the primitivist can simply accept it.

How is it that the primitivist can deny both explanations? Surely the connection between colors and reflectances is either a necessary connection, or is contingent on the laws of nature! What third option could there be? The answer is that commitment to one understanding of the connection or the other is tantamount to the endorsement of certain counterfactuals. An advocate of the nomological explanation of coextensiveness, such as McGinn, will hold that it is because of the relevant physical (and perhaps psychophysical) laws that objects with certain reflectances cause certain experiences in normal human beings, and that facts about the colors of objects supervene on the resulting dispositions of objects to produce experiences. Thus the following counterfactual is true:

N: If the relevant laws were such that an object with reflectance in class *X* (characteristic of actual red objects) produced experiences in normal human beings that were quite different from the experiences it actually produces, then that object would have a *different* color from that which it has in the actual world.

On the other hand, the advocate of the metaphysical understanding of the connection would deny this. That is, on the metaphysical understanding, the following counterfactual is true:

M: If the relevant laws were such that an object with reflectance in class *X* (characteristic of actual red objects) produced experiences in normal human beings that were quite different from the experiences it actually produces, then that object would have *the same* color as that which it has in the actual world.

Note that although the consequent of *M* is simply the denial of the consequent of *N*, this only implies that *N* and *M* exhaust our options on the assumption that any given counterfactual must be either true or false. This assumption is clearly false, since—to put it in Lewisian terms—it implies that there is always a unique closest antecedent world. Thus, in order to deny both explanations, the primitivist need only deny a determinate truth value to each of these counterfactuals.

This is a live option that is not available to reductive realists.⁴² Moreover, it seems to be the correct option, since it is the only option that allows us to talk both about worlds in which red objects appear blue (falsifying *N*), and about worlds in which red objects reflect light differently (falsifying *M*).

Many realist positions in other areas allow us to deny truth values to all of the members of analogous sets of seemingly exclusive and exhaustive counterfactual claims (typically either/or pairs). This is often the result of the fact that the meanings of the relevant property terms, in combination with what is specified in the antecedents of the counterfactual claims, underdetermines truth value. One explanation for this underdetermination has already been mentioned: the antecedent world may simply be underspecified. This is what is going on in Kripke's Nixon cases. A second explanation is that it is not necessary, for many property terms, to have ready rules determining their use in situations that never actually arise. For example, in our world people never split into two separate conscious beings. Nor do two separate people ever fuse into one person. As a result there is no need for rules governing the identification of people through such transformations. And, as a further result, there are no such rules, and no determinate truth value for claims about the identity of persons in counterfactual cases involving human fusion and fission. These truth-value gaps make absolutely no difference to our everyday use of the concept of a person, and are perfectly compatible with the literal truth of the claim that the author of this paper, and its readers, are people. It is quite implausible to say that our concept of a person is therefore, and "strictly speaking," incomplete.

V. OBJECTIONS

Primitivism is certainly still a minority view, despite its ability to avoid the kinds of errors that are characteristic of reductionist views: errors that either stem from or result in the attribution of too many properties to the colors. Because of its minority status, it is to be expected that it will meet with resistance. In this final section I want to deal with two objections to primitivist views that were not dealt with in passing above.

1. *Spectral Inversion and Indeterminacy of Referent.* David Chalmers offers an objection to color primitivism that involves the possibility of

⁴² Mark Leon comes to his view largely as a result of ignoring this possibility. See his "Colour Wars: Dividing the Spoils," *Philosophy*, LXXVII (April 2002): 175–92, at pp. 182–83. Leon is committed to the view that we would say that the colors of objects had changed, even if all that had happened was a systematic change in our own visual systems.

an inverted spectrum.⁴³ Putting it in Chalmers's terms for the moment, the objection involves the possibility of a person, or group of people, whose everyday color experience is inverted in relation to ours. These people, looking at grass, have experiences we would describe as of something red, and, looking at blood, they have experiences we would describe as of something green. Of course there are host of objections to this way of describing matters. If we assume that the inversion is supposed to be behaviorally undetectable, then there are powerful arguments that the inversion described is completely irrelevant to any claims about color at all. That is, on the assumption of undetectability, there is a strong case to be made that these people mean precisely what we mean by 'red', 'green', and so on, and that what they have, and what we have, when we look at a red object is (typically) appropriately described as 'an experience of red'.⁴⁴ But let us leave this aside for the moment, and make, with Chalmers, two assumptions.

- (1) In the actual world, people who are not color-blind represent the colors of objects correctly in most of the cases in which we would say that the viewing situation is normal.
- (2) Because the inverted people have different qualitative experiences when looking at grass and blood, the color primitivist must hold that they are attributing different color properties to those things.

Given these two assumptions, it is natural to ask, as Chalmers does,

when a subject in the [inverted] community has a phenomenally red experience of the apple, and a subject in [our] community has a phenomenally green experience of the apple, which of these experiences is veridical?⁴⁵

Given Chalmers's assumptions, it is reasonable to be led to his answer: 'neither'. But there is no reason to accept Chalmers's second assumption. According to some plausible views, and as long as the inversion is behaviorally undetectable, there is no problem with the answer 'both'. Chalmers rejects this answer because he supposes that it implies that grass would, in such a case, be both red and green: a situation which I am willing to grant is impossible. But it is possible to answer 'both', not because one holds the apple to be both red and

⁴³ See Chalmers, "Perception and the Fall from Eden," in Tamar Gendler and John Hawthorne, eds., *Perceptual Experience* (New York: Oxford, 2006), pp. 49–125. A similar objection is raised by Jim Edwards in "The Simple Theory of Colour and the Transparency of Sense Experience," in Crispin Wright, Barry Smith, and Cynthia Macdonald, eds., *Knowing Our Own Minds* (New York: Oxford, 1998), pp. 371–89.

⁴⁴ See Galen Strawson, "Red and 'Red'," *Synthese*, LXXVIII (February 1989): 193–232.

⁴⁵ Chalmers, "Perception and the Fall from Eden," §6.

green, but because one holds that both communities attribute the very same color property to the apple. This is easily seen by taking Wittgenstein's private language argument just seriously enough to realize that the particular qualitative experiences of human beings play no role at all in the teaching or learning of the meanings of color words.⁴⁶ If one half of the human population were, unbeknownst to us, actually undetectably inverted with respect to the other, that would nevertheless be no reason to suppose that, also unbeknownst to us, the word 'red' really had two meanings. Indeed, it seems to me that we have no reason whatsoever to be confident that we have any insight at all into the intrinsic qualitative experiences that other people have (unless such phrases as 'an experience in which something appears green'—which have a public use—counts as a description of an intrinsic qualitative experience), and that this lack of insight is of absolutely no importance to the question of whether or not we all mean the same thing by 'red' (or by 'an experience in which something appears red').

Of course, we have plenty of reason to believe that certain things—cherries and raspberries, for example—look red to other people: we have no reason to doubt their reports, for example, or their linguistic competence with the relevant phrases. Nothing in the Wittgensteinian position challenges the view that most people perceive colors correctly most of the time, in the sense that red things typically look red to them, and yellow things yellow. Rather, the Wittgensteinian position holds that we have no reason to think we have insight into what it is like for other people to have experiences in which objects look red—except of course that they are experiences in which objects look similar, in color, to red things. One might try to appeal to similarities in the eye and brain to support the view that we *do* have reason to believe that other people have intrinsic qualitative experiences that are very similar to ours.⁴⁷ In such a case one would be tempted to deny the existence of variation in qualitative experience within the actual human community unless genes were discovered that resulted in distinct connections in the retina, or some other variation in the neural pathways that lead from the retina to the visual centers of the brain. But we understand so little of the connection between brain function and phenomenal consciousness that we have no reason to deny the possibility that genetics leaves the final step from neurology to phe-

⁴⁶ See Wittgenstein, *Philosophical Investigations*, §243–93. See also Strawson, "Red and 'Red'."

⁴⁷ Byrne and Hilbert seem tempted to argue in this way. See their "Color Primitivism," pp. 88–89.

nomenology completely undetermined. After all, as long as an organism makes the correct color distinctions, there does not seem to be any evolutionary pressure to have any given sort of phenomenal experience when looking at something red. I grant that strict inversions, in which all the same hues are represented in the visual space of the inverted person, might not be possible. The reason for this is that human color space is quite asymmetrical: an inverted person of this sort would actually make different color classifications.⁴⁸ But if such inversions are ruled out, Chalmers cannot use them either, and must make use of thought experiments in which people have completely alien color spaces, or color spaces that share only a subset of hues with our own color space (or with *one's* own color space, if the reader is skeptical about our insight into the linguistically inaccessible phenomenal experiences of other people).

One might try to modify Chalmers's objection to make use of an inversion that is not undetectable. But if we imagine a group of people who classify objects differently than we do, then there is little reason to worry over Chalmers's rhetorical question. We should simply say that these other people see different colors than we do, just as cats and giraffes do.⁴⁹ The question as to which species perceives color correctly is obviously ill conceived if it is posed in a way that excludes the answer 'They all do'. In a similar way, in this modified version of Chalmers's thought experiment, so too is the question of which subgroup of human beings do.

2. *Animal Colors*. Alex Byrne and David Hilbert argue that primitivists cannot provide an adequate account of the discriminatory capacities of animals to which we would ordinarily attribute color vision. Goldfish, to borrow an example from Byrne and Hilbert, share many of the mechanisms of human color vision, but can see some way into the near ultraviolet, where human vision cannot penetrate. According to Byrne and Hilbert, there is a tension between primitivism and the extremely plausible idea that goldfish are responding to colors. The source of the tension stems from primitivism's connection with the thesis of Revelation. Revelation tells us that we know everything essential about the particular colors we see, just by seeing them. But if goldfish are responding to colors, and making color distinctions, it is extremely plausible that they are not making

⁴⁸ For a nice account of the problems involved in imagining such an undetectable spectral inversion, see Hardin, pp. 139–42.

⁴⁹ For more argument to this effect, see Watkins, "Do Animals See Colors? An Anthropocentrist's Guide to Animals, the Color Blind, and Far Away Places," *Philosophical Studies*, xciv (June 1999): 189–209.

those distinctions by responding to the colors we humans see. What colors are they responding to, then? Byrne and Hilbert think the primitivist has no good answer to this question, because the primitivist must say that the only properties that share a common nature with human colors—which goldfish colors would have to do, if they were to count as colors—are in fact the human colors. This is because, according to Byrne and Hilbert, “careful reflection on (human) color experience seems, if anything, to *exclude* the possibility of colors that are not located within the familiar color solid.”⁵⁰ The only way for primitivists to claim that goldfish are responding to colors, according to Byrne and Hilbert, is to claim that they are in fact responding to *human* colors. But in that case, they are responding in a wildly bizarre way! And the only way to avoid this unpalatable result, according to Byrne and Hilbert, is to deny that goldfish are responding to colors at all. Rather, the primitivist could say that while humans respond to colors, goldfish and other animals are responding to other properties. Reductionists, on the other hand, who identify colors with, for example, sets of spectral reflectances, can easily accommodate goldfish colors. For they can simply say that any set of spectral reflectances counts as a color, and those that goldfish respond to in a systematic way are goldfish colors.

In making this criticism of primitivism, Byrne and Hilbert seem to be confusing our capacity to represent novel colors to ourselves (which we cannot do) with our capacity to imagine that there are colors we cannot see (which we can). Thus the primitivist should simply deny Byrne and Hilbert’s undefended—and independently implausible—assertion that reflection on our color experience seems to exclude the possibility of colors outside of human color space. If a primitivist endorses Modest Revelation this need only commit her to the view that those of us who see orange things are aware of the essential nature of orange. One essential feature of orange is that it is a uniform property of opaque surfaces and transparent volumes. Goldfish colors will share this essential feature. What goldfish colors look like however, we will never know.

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⁵⁰ Byrne and Hilbert, “Color Primitivism,” p. 94.