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Explaining Objective Color in Terms of Subjective Reactions

Gilbert Harman

I am concerned with attempts to explain objective color in terms of subjective reactions so I had better begin by saying what I mean by “objective color” and what I mean by “subjective reactions”.

By “objective color” I mean the color of an object, in a very broad sense of “object” that includes not only apples and tables, but also the sky, a flame, a shadow, and anything else that has color. So, objective color in this sense includes the red of an apple, the blue of the sky, the yellow of a flame, the purple cast of a shadow, and so forth.

By “subjective reactions” I mean a normally sighted perceiver’s subjective impressions of color: how color looks. A person blind from birth might learn that objects have colors and might in some sense have subjective reactions to color, but not the sort of subjective reactions I mean.

I will be concerned both with the sort of explanation of color and the relevant subjective reactions to color that is available to normally sighted perceivers and with the sort of explanation that is available to others, including those who cannot have the relevant subjective reactions themselves.

1 Why Objective Color Should Be Explained in Terms of Subjective Reactions

Many salient facts about color cannot be explained purely in terms of properties of the surfaces of colored objects. We need also to appeal to the biology and psychology of color perception. These facts include red's being closer in color to blue than to green, even though the frequency of pure red light is farther from that of pure blue than from pure green. Related to that fact is the circular structure of hues, as opposed to the linear structure of relevant light frequencies. There is also the way in which colors can be organized in terms of three polar contrasts, white-black, red-green, and blue-yellow. These aspects of color are due to facts about the biology and psychology of color perception rather than to facts about the structures of surfaces.

Shepard (1992, 1993) offers an evolutionary explanation of the biological and psychological facts by noting that natural illumination from the sun varies in three independent respects: (1) in amount of total overall illumination, (2) in relative amount of longer red wavelengths (depending on the sun's angle), and (3) in relative amount of shorter blue wavelengths (depending on whether illumination is directly from the sun or indirect from light scattered by the atmosphere). (If the red wavelengths are removed from sunlight, the remaining wavelengths center on green. If the blue wavelengths are removed instead, the remaining wavelengths center on yellow.) Given these sorts of variation in natural illumination, a visual system structured like ours, in which light is analyzed in terms of white versus black, red versus green, and yellow versus blue, will be able to achieve a kind of constancy in colors attributed to objects, a color constancy that Shepard sees as having evolutionary benefits.

Shepard's evolutionary account contrasts with the suggestion in Dennett (1991) that human color perception and the colors of natural objects have evolved together. But Shepard's proposal explains facts of color perception not accounted for by Dennett's suggestion. In what follows, I will assume Shepard is basically right.

In any event, it would seem that we have to explain facts about objective color in terms of facts about perceivers (Gold, 1993).

One simple way to do so identifies an object's being a particular color *C* with its tendency to be perceived as *C* by normal observers viewing it under standard lighting conditions. Various complications arise here, e.g., concerning chameleon's that change color when looked at (Johnston, 1992). I want to disregard those (significant)

issues in order to try to say more about the relevant subjective reaction, “perceiving something as C”.

2 Color Sensations

Some authors call the relevant subjective reactions “color sensations”. A normal viewer’s perception of a red object in adequate lighting provides the viewer with “red color sensations”. Some authors (Shoemaker, 1981; Peacocke, 1983) use the term “color qualia” in much the same way that other writers use the term “color sensations”. I will argue below (section 4) that talk of color sensations is misleading in important respects, but let me use that terminology for the time being.

In these terms, a blind person does not in the normal way obtain color sensations from the perception of objects. Someone blind from birth may never have experienced color sensations. Such a person would normally not know what it is like to have such sensations.

Red color sensations are not red in the same sense in which red apples are red. We might say that red apples are red in the sense that they tend to produce certain reactions when viewed by perceivers. But red color sensations are not red in that sense. Red sensations cannot be viewed and they are (supposed to be) the relevant reactions, not the causes of the reactions.

To avoid possible confusion, some authors use a symbolism that distinguishes these senses of the word *red*, for example, distinguishing the word *red* from the word *red'* and saying we have *red'* color sensations rather than red color sensations (Peacocke, 1983).

One problem is to say how these senses are related.

2.1 OBJECTIVE COLOR EXPLAINED IN TERMS OF COLOR SENSATIONS

It may seem that the most obvious way to relate the two senses of color terms along the lines of the suggested reduction of objective color to subjective reactions is to try to define the colors of objects in terms of the color sensations they produce in observers: An object is red if and only if perception of it would give normal perceivers *red'* sensations under standard viewing conditions.

A number of issues arise here. What makes a perceiver a normal perceiver? What determines standard viewing conditions?

Circularity must be avoided. A normal perceiver cannot be defined as one who gets the right sensations from colored objects, nor can

standard viewing conditions be defined as those in which normal perceivers get the right sensations.

One possible approach simply asserts that there are objective criteria of normalcy N and objective criteria of standardness S such that an object has color C if and only if perception of it by perceivers who are N in conditions that are S would produce C color sensations. Let us suppose for the sake of argument that such criteria exist. (A full account would have to investigate the criteria S and N .)

2.2 COLOR SENSATIONS AS BASIC

A further issue concerns the nature of color sensations. What are they and what makes a sensation that sort of color sensation that it is?

Many authors (e.g., Nagel, 1974) believe that no purely scientific account of color sensations is possible. In their view, the essence of such sensations is precisely their subjective “qualitative” character. They believe that there is no way to describe this qualitative character in purely scientific terms so that it would be fully understood by someone who had never experienced the sensation first hand; someone who has never experienced a red’ sensation cannot know what it is to have such a sensation.

In their view, the notion of a red’ sensation is the notion of a sensation “like this”, where “this” refers to a sensation that one is actually experiencing or imagining.

Since in this view the redness of an object is its power to produce red’ sensations in perceivers, it follows that someone who has never experienced a red’ sensation cannot fully understand what it is for an object to be red. A red object is an object with the power to produce sensations “like this” in perceivers. Someone who never experiences a red’ sensation is never in a position to be able to identify red objects as objects with the power to produce sensations “like this”.

I postpone discussion of what conception of color and color sensations might be available to someone who has never had such experiences.

2.3 VARIATIONS IN COLOR SENSATIONS

It is interesting to consider the possibility that different people might have relevantly different sorts of sensations when perceiving objects that they call “red”.

This possibility may seem quite likely, (1) if the relevant aspect of a sensation is its intrinsic qualitative character, (2) if the intrinsic qualitative character of a sensation depends on the exact nature of the underlying physical events in the brain giving rise to the sensation, and (3) if there are differences in these underlying physical events from one brain to the next (Block, 1990, pp. 56-57).

The suggested analysis of objective color in terms of sensations implies that, if there are relevant differences in people's color sensations, then different people have different concepts of the colors of objects and do not mean the same thing by their color terms. They do not mean the same thing by "red", "green", etc. even though they use the terms in exactly the same way of exactly the same objects, at least as far as their outer usage is concerned.

For George, an object is red if and only if it has the relevant power to produce sensations "like this" in normal perceivers, where George refers to the kind of sensation that he gets from viewing red objects. For Mary, an object is red if and only if it has the relevant power to produce sensations "like this" in normal perceivers, where Mary refers to the kind of sensation that she gets from viewing red objects. If George and Mary get different sorts of sensations from viewing red objects, they mean different things when they say that an apple is "red", in this view.

This is actually a pretty strange consequence: that people might mean different things by their words even though they use them in the same way with respect to objects in the world. But a further consequence is even stranger. Given the hypothesis that people do get different kinds of color sensations from objects they call "red", the suggested analysis implies that no objects have any colors (Block, 1990, p. 56)!

According to the analysis, an object is red if and only if it has the power to produce sensations "like this" in normal perceivers viewing the object in standard viewing conditions. But, by hypothesis, no object has that power. A ripe tomato may have the power to produce sensations "like this" in me under those conditions, but it does not have the power to produce sensations of that sort in all other normal perceivers viewing the object in standard conditions. By hypothesis, viewing a ripe tomato produces different kinds of sensations in different otherwise normal perceivers. So, the analysis we are considering implies that a ripe tomato has no color, given that hypothesis.

So we have two absurd results. First, different people mean different things by their color terminology even when they use the terminology in the same way of external objects. Second, when people

use color terminology to say that eternal objects are “red”, “blue”, or whatever, what they say is always false.

To avoid such absurd results, we must either abandon the suggested analysis of objective color or rule out the possibility that different perceivers get different sorts of color sensations from viewing objects called “red”.

3 Functional Definitions of Color Sensations

The discussion so far has assumed that it is possible to fix on a kind of sensation by attending to it and intending to include in that kind of sensation anything “like this”. But a sensation that occurs on a particular occasion can be classified in infinitely many ways and is therefore an instance of many different kinds of sensation. The sensation itself does not determine a single kind or type of sensation. Saying that red objects are objects with the power to produce sensations “like this” is not yet to say what type of sensations red objects have the power to produce, since there are infinitely many different ways in which sensations can be “like this”. It is necessary also to say in what respect sensations have to be “like this” in order to count as “red’ sensations”.

It would be wrong to say that a sensation has to share every aspect of “this sensation” if it is to be “like this”, for then no other occurrences would count. There are always some differences among sensations: they occur at different times, have different causes, different effects, occur to different people, and so forth. Not all these differences are important. For example, the fact that “this sensation” is a sensation of mine distinguishes it from all sensations of other people, but that had better be irrelevant to its being a red’ sensation if anyone else is to be able to have a red’ sensation.

What is needed is a way of classifying sensations so that the sensations normal observers have on viewing a given color normally fall under the same classification, even if, according to some other way of classifying sensations, people have different sorts of sensations from viewing a given color.

One approach to solving the problem of type specification appeals to a “functional definition” of the relevant type of sensation in terms of typical causes and effects (Armstrong, 1968; Lewis, 1966). For example, the sensations classified as pains are those that are typically caused by tissue damage or extremes of pressure or heat applied to some location in one’s body and that typically have as effects the

belief that something undesirable is occurring at the relevant bodily location and the desire to be free of the occurrence.

A first stab at a functional definition of color sensations might suppose that they are typically caused by the perception of appropriately colored objects and that their typical effects are beliefs that perceived objects have the appropriate colors. So, a red' sensation would be a sensation that is typically caused by the perception of red things and that typically leads to the belief that one is perceiving something red.

Various worries can be raised about this account and more needs to be said. If it could be made to work, the suggested account would avoid some of the problems raised about the previous account. The account would not have to suppose that differences in the brain events that underlie color sensations mean that different otherwise normal perceivers have relevantly different sensations from the perception of the same objects. If you and I are both normal color perceivers, we will both receive red' sensations from the perception of ripe red tomatoes. What we mean by "red object" (namely, "object with the power to produce red' sensations...") will be the same if we use the word in the same way of external objects, even if our red' color sensations differ in their detailed neurophysiological realizations.

However, when a functional account of color sensations is combined with an explanation of objective color in terms of color sensations, the resulting account of objective color is circular. It reduces to the claim that red objects are those that produce the sort of sensation that red objects produce. This is not only to explain the notion of objective color in terms of itself but to do so in a way that is almost completely empty.

4 Complication: There Are No Color Sensations

Before addressing the problem of circularity, it is necessary to clear up a point we have been so far ignoring, namely, that it is wrong to describe color impressions as color "sensations".

Normally, we use the term "sensation" for bodily feelings. Usually sensations have a more or less definite location in one's body — a headache, a pain in one's foot, butterflies in the stomach, etc. There are also other cases, such as a sensation of dizziness.

But the perception of color does not normally involve sensations in any ordinary sense of the term "sensation". When someone literally has visual sensations, they are pains or other feelings in the eye,

resulting from overly bright scenes, perhaps, or itching from allergies or minor eye injuries. Color perception does not normally involve such sensations. On seeing what appears to be a ripe tomato, one does not feel a sensation of red in one's eye, nor is there literally a sensation or feeling at the location at which the tomato looks red.

How then should we think of perceptual experience, if not as involving visual sensations?

4.1 REPRESENTATIONAL CHARACTER OF PERCEPTUAL EXPERIENCE

One important point is that perceptual experience has a certain presentational or representational character, presenting or representing the environment in a certain way. When it looks to you as if you are seeing a ripe tomato, your perceptual experience presents or represents the environment as containing a red and roughly spherical object located at a certain distance and orientation "from here".

When you think about visual representation, it is very important to distinguish (A) qualities that experience represents the environment as having from (B) qualities of experience by virtue of which it serves as a representation of the environment. When you see a ripe tomato your visual experience represents something as red. The redness is represented as a feature of the tomato, not a feature of your experience.

Does your experience represent this redness by being itself red at a relevant place, in the way that a painting of a ripe tomato might represent the redness of the tomato with some red paint on the appropriate place on the canvas? No. That is not how visual representation works.

Does your experience represent this redness by having at some place some quality other than redness, a quality of red'ness, which serves to represent the redness of the tomato in some other way, different from the way in which a painting might use red paint to represent a tomato? Well, who knows? You have no conscious access to the qualities of your experience by which it represents the redness of the tomato. You are aware of the redness of the represented tomato. You are not and cannot become consciously aware of the mental "paint" by virtue of which your experience represents the red tomato.

It follows that your concept of a red object cannot be analyzed into your concept of a red' experience, meaning the specific quality that your perceptual experience has in order to represent objective redness, because you have no such concept of a red' experience. You

have no idea what specific quality of your perceptual experience is used to represent objective redness. You only have the concept of objective redness!

4.2 THE CONCEPT OF COLOR

In fact, your color concepts are almost certainly basic and not analyzable in causal terms. You perceive colors as simple primitive features of the world, not as dispositions or complexes of other causal features.

(Maybe some color concepts like orange can be analyzed in terms of concepts of primary colors, like *red* and *yellow*. And maybe some color concepts like *brown* can be analyzed in terms of hue, brightness, and saturation. I am not concerned with such internal analyses. I am concerned only with analyses of color in external terms, especially causal terms.)

Now, a scientific explanation may involve an analysis of something without claiming to be analyzing an ordinary concept. For example, when a scientific explanation of facts about the circle of hues treats color as a tendency to produce certain responses in perceivers, it is not offering that analysis of color as an account of the perceptual concept of color. The perceptual concept of color can be quite simple even if color itself is a complex phenomenon.

Of course, it would be useful to give an account of what it is *to have* a basic perceptual concept like the concept of redness, an account that might even be understood by someone lacking that basic perceptual concept. A congenitally blind person can understand that a normal color perceiver might have a basic perceptual concept of redness, for example. And normal color perceivers can understand that there may be animals or other alien creatures with basic perceptual concepts that humans do not have. To this end, we might try to provide a functionalist account of what it is for perceptual experience to have a given perceptual concept.

Now, in general, perceptual experience represents the environment in ways that enable a perceiver to negotiate paths among objects, to locate desired things and to avoid undesired things. Normally and for the most part, a perceiver accepts his or her (or its) perceptual representation, believing that things are as they appear, although the strong disposition to acceptance can be inhibited on special occasions.

The perceptual concept of red figures as part of the perceptual experience of red objects, enabling a perceiver to identify and re-identify objects as red. In other words, if a perceptual concept is a

concept Q such that one has perceptual experiences of something being Q , then (roughly speaking) we can say that the concept Q is the concept of redness if perception of red things tends to produce experiences of something being Q .

But we must be careful to avoid circularity. Recall that we have been supposing that red is a tendency to produce perceptual reactions of a certain sort. We have seen that it is incorrect to describe the relevant reactions as sensations. Suppose then that we take the relevant reactions to be experiences with a certain representational or presentational content. If the relevant representational or presentational content is then identified functionally, we seem to be identifying redness as a property R , where R is a tendency to produce experiences that represent something as Q , where Q is the concept produced by perception of R things. That characterization is circular and does not distinguish red from green, for example.

Sosa (1990) points out that we can avoid circularity if we use the normally sighted person's primitive perceptual concept of red objects in our account. Then we can say that something is red if and only if it has a property R , where R is a tendency to produce experiences that represent something as Q , where Q is the concept produced by perception of red things, where here we are using the primitive perceptual concept red.

Of course, a person lacking that perceptual concept of red could not avoid circularity in the way Sosa suggests. Nor could normal human perceivers use that approach to provide noncircular accounts of animal or alien perceptual concepts that do not correspond to human perceptual concepts.

One noncircular account that might be useful to those lacking the relevant perceptual concepts would identify color in terms of biological mechanisms of color perception, perhaps via the evolutionary reasons for those mechanisms. In this view, for something to be red is for it to have a tendency to have a certain specific complex affect on a normal perceiver's sensory apparatus, in ways described by the scientific theory of color.

5 The Inverted Spectrum

Supposing this last account can be made to work up to a point, one might still worry that it seems to leave out an important aspect of color perception. As Block (1990) puts the objection, the functional account of what it is to have a concept of red captures the "intentional content" of the concept, but not its "qualitative content".

Qualitative content is what we imagine to be different when we imagine that one person perceives colors in a way that differs from the way in which another person perceives them. We seem even to be able to imagine the possibility of an inverted spectrum in the sense that the way things look to one of two otherwise normal color perceivers, George, might be qualitatively hue inverted with respect to the way things look to the other, Mary (Shoemaker, 1981).

It is not that (we imagine that) what looks red to George looks green to Mary. A given object looks green to both or red to both. That is, the colors their experiences represent the environment as having are the same. The imagined difficulty is that “what it is like” for George to see something as red is different from “what it is like” for Mary to see something as red.

The “what is it like” terminology comes from Nagel (1974). I am not convinced that this particular appeal to “what is it like” for a particular person to see something as green is in the end really intelligible. (I discuss what this might mean in section 7, below.) But let us assume that it is intelligible in order to explore the idea.

As I have argued, the difference in “what it is like” for George and Mary to see something as red cannot be a difference in visual sensations, so it has to be a difference in how George and Mary perceive objects to be. And it cannot be a difference in what colors they perceive objects to have, because they both count as correctly perceiving the colors of objects. The difference between them cannot be at that level.

So, the difference must be a difference in other qualities that objects are presented or represented as having. What we are imagining, then, seems to be something like this (Shoemaker, 1994).

When George sees a red apple, his perceptual experience represents it as being Q . His experience also represents the apple as being red. Furthermore, the fact that his experience represents the apple as being Q makes it true in present circumstances that his experience represents the apple as being red. It seems we can imagine other circumstances in which neuronal connections leading from George’s retina to his visual cortex were switched before birth in such a way that later, when his experience represents something as being Q , that constitutes representing it as being green, because, in these imagined circumstances, the perception of green things normally leads George to have perceptual experiences of those things as Q .

When we imagine normal perceivers like George and Mary with inverted spectra, we are then imagining something like this: A red object looks Q to George and T to Mary. A green object looks T to George and Q to Mary. An object’s looking Q to George counts as

its looking red to George. An object's looking Q to Mary counts as its looking green to Mary.

This may seem odd, so let me briefly review what led to this seemingly strange idea. We want to describe a case in which two people have inverted spectra with respect to each other. The difference between them has to be a difference in what they experience, but it cannot be a difference in properties they perceive their experience to have, because the relevant properties are perceived as properties of objects in the environment. The difference cannot be a difference in the colors they perceive these objects to be, because we are assuming that, as normal color perceivers, they attribute the same colors to external objects. So, it has to be a difference in other properties objects are experienced as having, properties we can identify as Q and T .

6 Worries about Inverted Spectra

I am not sure that the imagined possibility of inverted spectra is really coherent. (Please note: I am not sure.)

A red object supposedly looks Q to George and T to Mary. It would seem that an object cannot be both Q and T in the same place at the same time in the same way. That would be like an object's being both red and green at the same place and time in the same way. But then, either George's experience or Mary's experience or both of their experiences must be in some respect nonveridical, incorrectly representing the object seen.

Shoemaker (1994) observes that the best way to avoid this result is to suppose that the properties Q and T are radically relational, so that something can be Q to one person without being Q to another. Q and T would be incompatible only in the sense that an object cannot be both Q and T to the same person at the same place at the same time in the same way. On the other hand, an object could be Q to George and T to Mary at the same place at the same time in the same way.

What is it for an object to be Q to a given person? Shoemaker (1994) mentions two possibilities. First, it might be that an object is Q to a given person S if and only if S 's perceptual experience currently represents the object as Q . Second, it might be that an object is Q to a given person S if and only if the object has a tendency to provide S with perceptual experiences representing that object as Q . In the first case, objects are Q to S if and only if S is experiencing them as Q . In the second case, objects can be Q to S even if S is not

currently experiencing them if they are such as to produce relevant experiences under the right conditions.¹

But either of these possibilities involves a serious circularity. In order to understand what the concept *Q* is, we need to understand what objects are *Q* to someone, but in order to understand what objects are *Q* to someone, we need to understand what the concept *Q* is.²

Recall Sosa's point, noted on page 10 above, that we might use the perceptual concept of color possessed by normal color perceivers to give a key part of a functional account of what it is to have such a concept: the perceptual concept of red is activated in perceptual experiences produced by the perception of red objects. Could we use the same idea here—experiences involving the concept *Q* are produced by perception of *Q* objects? That explanation would be satisfactory only if one had a firm grasp of the concept *Q*. But I do not find that I have a firm grasp of that concept.

If it is suggested that we try to break out of this circle as I suggested we might break out of our earlier circle with respect to actual color terms, like "red" and "green", by appeal to some tendency objects have to affect *S*'s perceptual mechanisms, I find myself at a loss to know what aspects of perceptual mechanisms would be relevant.

Settling on something, for example, certain events in the visual cortex would seem simply to let the same problem arise all over again. For surely we can imagine even molecule for molecule identical people with the same events occurring in their visual cortex having inverted spectra with respect to each other. That seems to be just as imaginable as the previous case.

But this suggests the "problem" is really a pseudo-problem.

This makes me doubt that there is a concept *Q* of the claimed sort and so doubt that I have the relevant grasp of "what it is like for so and so to see red" that would allow me to suppose that red things might look different to different, otherwise normal, color perceivers.

¹I have oversimplified. Shoemaker's actual account supposes that an experience has a certain intrinsic phenomenal feature *x* that is responsible for its representing something as *Q*. For something to be *Q* is for it to be such as to produce experiences with feature *x*.

²Shoemaker's attempted way out of this circle is to say, for example, that experiences of something as *Q* (i.e., experiences with feature *x*) are those experiences that "are phenomenally like those I have when I see a ripe tomato". That would help only if we already had the sort of account of interpersonal phenomenal similarity that would enable us to make sense of interpersonal inverted spectrums. But we are in the process of trying to develop such an account. So that account would be circular if we adopted Shoemaker's suggestion.

But let me try to say more about “what it is like” to have an experience of a certain sort.

7 What Is It Like To See Red?

Terminology can become confusing here because different people seem to use similar terminology in different ways and people often use a variety of terminology. For example, philosophers talk about “what it is like” to have a given experience, about an experience’s “phenomenological character”, and about “qualia”, as if these are different ways of getting at the same thing.

In fact, at least two different issues are involved. Let me explain by citing two different ways in which the term “qualia” has been used. First, qualia are sometimes taken to be experienced qualities of a mental experience, those qualities by virtue of which one’s experiences represent what they represent (when they represent things), the mental paint of one’s picture of the environment, one’s mental sense-data. Philosophers who use the term “qualia” in this sense tend to hold that not all mental experiences involve qualia. They take qualia to be involved in perception and sensation but not always in relatively abstract beliefs and thoughts. In this sense of “qualia”, it is at least a matter of controversy whether all experiences involve qualia.

On the other hand, qualia are sometimes identified with what it is like to have a given experience and it is supposed to be relatively obvious that all mental experiences involve qualia. Even with respect to a relatively abstract judgment, there is something that it is like to have that judgment —some qualitative character in this second sense.

Now, as I have indicated already, I am strongly inclined to deny that there are qualia in the first sense, the mental paint or sense datum sense. In perception, all qualities of which we are aware seem to be presented to us as qualities of perceived things, external objects for the most part. Introspection does not support the claim that we are aware of mental paint. And, although arguments can be given for supposing that despite appearances we are aware of mental paint, these arguments seem to be uniformly fallacious through confusions over intentionality (Harman, 1990a). So I see no reason to suppose that we are aware of mental paint.

With respect to qualia in sense (2), what it is like to have a given experience, I agree with Nagel (1974) that there is a distinctive kind of understanding that consists in finding an equivalent in one’s own

case. That is “knowing what it is like to have that experience”. I have compared that sort of understanding with knowing what an expression used by someone else means. One understands it to the extent that one finds an equivalent expression in one’s own language or by learning how to use the expression oneself. Even if use determines meaning, an external objective description of use need not provide the sort of understanding that comes from knowing the translation into one’s own terms. (Harman, 1990b, 1993a).

Translation is a holistic enterprise. I map as much as I can of your language into mine in a way that tries to preserve certain constraints as much as possible (Harman, 1993b). Similarly, in trying to understand what it is like for you to have certain experiences, I map as much as I can of your total experiential system into mine in a way that tries to preserve certain constraints as much as possible.

In either case, there is the possibility of “indeterminacy of translation” (Quine, 1960). We can imagine that there are two different ways to map your color vocabulary into mine, or your color experiences into mine, preserving relevant constraints as much as possible. That is to imagine a genuine indeterminacy as to what it is like for you (or me) to see red, just as there is a genuine indeterminacy as to the best interpretation of numbers in set theory.

With respect to the color experiences of normal perceivers who are normal speakers of English, there is no such indeterminacy, because the relevant constraints on mapping one person’s experiences into another’s include taking into account what objects in the world give rise to those experiences.

So, what it is like for one normal color perceiver to see red is quite similar to what it is like for any other normal color perceiver to see red.

8 Conclusion

My tentative conclusion is that objective color is plausibly identified with a tendency to produce a certain reaction in normal perceivers, where the relevant reaction is identified in part with reference to the mechanisms of color perception.

The subjective response to color is constituted by perceptual experience presenting or representing the environment as relevantly colored. The concept of color as it figures in this representation is simple and unanalyzable in causal terms, because color is experienced as a simple basic quality, rather than a disposition or complex of causal properties. Possession of a perceptual concept of color is

to be understood functionally: objective color leads to experiences in which the perceptual concept of color is manifested.

These causal accounts do not capture everything we seem to be able to imagine about color. In particular, they do not allow for possible inverted spectra in otherwise normal color observers. But it is far from clear that what we seem to be able to imagine is actually a coherent possibility.

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