Philosophical Issues, 13, Philosophy of Mind, 2003

LOOKS AS POWERS

Philip Pettit
Princeton University

Although they may differ on the reason why, many philosophers hold that it is *a priori* that an object is red if and only if it is such as to look red to normal observers in normal conditions—and that the other colours sustain corresponding *a priori* biconditionals. But the explication of being red by reference to looking red is not complemented by a great deal of attention to what it is for an object to look red, or to look any other colour. And this paper is addressed to that less thoroughly discussed topic.

Looks are sometimes understood functionally, sometimes epistemically. An object will functionally look red to a subject so far as visual exposure elicits the belief that it is red, and does so independently of collateral beliefs such as the belief that it is a ripe tomato. An object will epistemically look red so far as visual exposure inclines the subject, independently of collateral beliefs, to believe it is red—this is a weak version of the functional condition—and the subject is aware of it as having that effect: aware of it as visually eliciting the belief that it is red.[1] I shall be concerned in this paper with epistemic colour looks, not just with their functional counterparts. I think of looks as being capable of guiding our use of colour terms in a more or less reflective way, as argued in the first section, and only epistemic looks could play the required part.

But there are two quite different things that you might mean in saying, with an epistemic reference, that something looks red. You might mean that overall you are unsure whether it is red but that the evidence points in that direction: it looks red in the sense of being, as far as you can judge, red. 'It looks red, I think', as you might say of something seen in the distance. Or you might mean, without implying that you are uncertain what to think overall, that it has the visual cast of a red object: it looks red in the sense of being, for all perceptual purposes, red. 'Well, it certainly looks red', you might say of an object in clear view—say, something you've been told is

brown, something you may even believe is brown. The first sense of looks implies uncertainty in your global, epistemic stance, saying nothing on your perceptual or collateral reasons for the uncertainty. The second sense implies certainty but not in your global, judgmental take—it may say nothing about that—only in your local, perceptual processing.

I am concerned here with what it is for an object to look red in the epistemic, perceptual sense. I distinguish between two theories of what occurs, one of which I describe as the *qualia* theory, the other as the powers theory—the theory of looks as powers. I defend the powers theory, arguing that something looks red just in case it manifestly enables the subject to identify it in a suitable way—contrast it, classify it, and so on—and to form a suitable expectancy as to how it will prove identifiable in varying conditions; just in case it empowers the subject in those respects. I see this theory as belonging with a number of distinguishable approaches that have begun to crystallise in recent work on perception. All of these approaches, like that which is sketched here, emphasise the connections between perceptual capacity and responsive—often motor—ability; perhaps they should even be seen as variants on one and the same approach (see Thompson 1995; Hurley 1998; Clark 1999; Myin 2001; Myin and O'Regan 2002; Noe 2002; O'Regan and Noe 2002).

My paper is in five sections. The first defends the colour biconditional, arguing that there is an important sense in which it is *a priori* that something is red if and only if it is such as to look red to normal obervers in normal conditions; this draws on work I have done elsewhere (Pettit 2002; Pettit forthcoming). The second section examines the *qualia* theory of what looking red involves, arguing that while the theory would vindicate the linkage with redness asserted in this biconditional, it carries unattractively heavy metaphysical baggage. And then the third, fourth and fifth sections are given to developing and defending the alternative, powers approach. The third section introduces the general idea, the fourth elaborates it, and the fifth documents its advantages. The paper focuses on what it is for objects proper to look red, ignoring the special issues raised by illusions and also by the colours displayed in lights, liquids, gases and the like.

1. The biconditional

The most obvious way of taking the biconditional for redness makes it very unintuitive and implausible. This interpretation would place the biconditional on a par with the claim that it is *a priori* true that something is fragile if and only if it is such as to break under ordinary pressure in ordinary circumstances. It would suggest that just as we conceive of fragility as an explicitly dispositional property—the property of having a structure which ensures that certain pressures will induce breaking—so we conceive of redness in the same way; we think of it as the property in an object of having

a structure which ensures that illumination will elicit red sensations in normal subjects under normal conditions. Or it might suggest that we conceive of redness—some think we conceive of fragility this way too—as the structural, disposing property that underlies the disposition. The details do not matter. In either case the idea is that we conceive of redness under a dispositional aspect: that is, conceive of it as satisfying the dispositional profile expressed in the biconditional.

This interpretation is implausible, for it supposes that those of us who have the concept of the colour *red* do so by virtue of having the independent concept of a red sensation, and indeed of normal observers and conditions. And that is surely crazy. We ordinary folk think of redness, plausibly, as a property of objects that we can just point to in things. It is a property that we see and ostend in the world around us, and that we can see and ostend without necessarily having any fancy dispositional concepts at our disposal (Campbell 1993).

But if redness is available to us in perception without our seeing it under a dispositional aspect, how can the biconditional be true, let alone true as an *a priori* matter? The answer is that it can be made true by the way the reference of the term 'red' is determined in our usage, without this mode of reference-determination necessarily being registered in any details.

Think about how I must have learned to use the term 'red'. I will have had to pick up a range of facts like the following, and to be able to reflect them in my own use of the term.

- The only way of knowing whether something is red is observational: one learns about the redness of things from one's own observation or from the observational testimony of others;
- observation does not generally miss or mistake redness: it is true, as a rule, that anything red is observationally red and that anything observationally red is red;
- what is true as a rule is not true without exception, for there are cases where divergences across times of observation, or across different observers, show that something is amiss;
- assuming that there is a genuine redness property in things, however, and that it is accessible most of the time to most human beings, then absent vagueness, there are bound to be factors to explain divergences of this kind;
- observation fails as an index of redness precisely in those cases where such factors are in play—on the assumptions given, the factors will count as obstacles to colour vision;
- common experience and practice—negotiation over how to explain and rectify discrepancies—has identified many examples of such obstacles: strange lighting, coloured glasses, partial or complete colour blindness, and so on.

I think that it is uncontroversial that in being introduced to how to use the term 'red', we are bound to have been put in a position to acknowledge facts of these kinds. How could anyone be competent in the use of 'red' and not know that it is an observational term; that observation is not absolutely reliable; and that its reliability turns on whether there are factors present that, as we think, block ordinary access to the colour *red*?

But the fact that these claims are sound has important implications. For it means that for a community that uses the term 'red', or any translation or synonym, the definitive criterion of whether something is red will be whether it is such as to prove observationally red, or at least to prove observationally red in the absence of those sorts of factors that explain divergence across persons or times. It will be *a priori* for the members of such a community, then, that something is red if and only if it is such as to look red in the absence of such factors: it is, in one interpretation, such as to look red to (all) normal observers in (all) normal conditions (Pettit 2002, Pt 1, Ch.5). This will be *a priori* so far as it is something they are in a position to recognise just by reflection on their linguistic practice.

The *a priority* of the connection between being red and looking red depends, under this construal, on what is required for the term 'red' to have a particular property as its semantic value. Suppose we think of the redness of an object as its surface spectral reflectance—better perhaps, given variability in certain dimensions, as a profile of such reflectances—where surface spectral reflectance is what determines the extent to which a surface reflects incident lights of different, colour-associated wavelengths (Byrne and Hilbert 1997, 265–67). And suppose that this property is rigidly designated by the term 'red'. The connection between something's being red in that sense and its looking red will be due entirely to semantic facts. The surface spectral reflectance in question will qualify as the referent of 'red'—it is what 'red' will denominate—so far as it is what causes red sensations in normal, actual-world observers under normal, actual-world conditions. We might express the colour biconditional more exactly by saying that according to the argument provided something will be denominably red for a given community if and only if it is such as to look red to all normal observers under all normal conditions.[2]

Robert Stalnaker (forthcoming) argues that it is important to distinguish between two semantic enterprises. First, the descriptive semantics that assigns to terms in a language the items that serve as their semantic values; and, second, the foundational semantics that tries to explain for a given term-item pair, what it is about the item that qualifies it to be the semantic value of the term. I have been saying that what qualifies the property of redness as the semantic value of the term 'red'—whether this is conceived as a surface spectral reflectance profile, or in other terms—is the fact that it is what actually makes things look red to normal observers in normal conditions. It is this semantic fact—this fact in the foundational semantics

of the term—that makes the biconditional for redness true, and true in an *a priori* accessible way.[3]

Another and older way of summing up the line of thought we have been pursuing is to say that redness is a natural property, rigidly picked out by the term 'red', and that whatever the real essence of redness—whether it be essentially a surface spectral reflectance or not—its nominal essence consists in its being such as to look red to normal observers in normal conditions. In other words, what unifies the property for those who name and invoke it, what unifies it as a property that is present now here, now there, is the fact that it causes bearers to look red when normality is assured. The salient, eye-catching aspect of the property for ordinary people is that it is a red-looking property.

If the redness of objects is indeed a surface spectral reflectance, or reflectance profile, or anything of that ground-level kind, then its real essence will be physical—the essence or nature of redness will be explicated within physical science—and this will be quite distinct from the nominal essence of redness. Notice that things would be otherwise if object redness were identified, not with that lower-order property that disposes things to look red, but with the higher-order, dispositional property of the object's having a lower-order property with that disposing effect; the real essence of such a property would be identical with the nominal essence. I shall assume here that the redness of objects should be identified with the disposing property—or if these vary, with a disjunction of such properties—not with the dispositional one. Where dispositions are manifested in their displays, rather than contingently causing them to occur, redness is a property that hits us in the eyes, affecting us in a distinctively causal manner (Jackson and Pargetter 1987; Jackson 2000). This suggests that it should be taken as the property that underlies the disposition of things to look red, and something that has a real essence distinct from its nominal, looking-red aspect. The assumption is not essential to the argument that follows, but making it explicit will make the presentation of the argument somewhat more straightforward.

At the beginning of the section I rejected the view that we conceive of redness and see redness under its dispositional aspect: I argued that, on the contrary, we conceive of it and see it as a simple, categorical property. Under the story just told, however, what remains true is that we come to conceive of red, and we come to see red *through* its dispositional aspect, if not *under* it. While redness does not become salient to us as something that plays a certain dispositional role—as something that has the observed effect of making things look red—it does become salient in virtue of playing that role, actually making things look red to us.[4] If we identify redness in an object with its spectral reflectance profile, then, we must add that the property is represented by us in abstraction from, and generally in ignorance of, its reflectance character: all we know of it, and all that matters to our

understanding of the property, is what we know in relating to it through its dispositional role.[5]

2. The qualia theory

So much for the dispositional aspect through which redness gets to be salient for us. But how do things look when that dispositional aspect is activated? How do things look when they look red?

The traditional answer to this question is that something looks red if and only if there is a way it looks that is independent of the characteristic effects that the perception of something red is expected to have. These are its effects in enabling observers to sift the red object out from non-red things, to sort it with other red objects, to track it on the basis of its redness and, since this pattern of discriminability is the mark of redness under normal conditions, to judge that it is red. The line is that while something's looking red involves such effects, the way it looks is independent of the effects themselves; thus it might be associated with different effects, or those effects might come about without that particular look.

Looks, as conceptualised in this theory, are almost always credited with three aspects. First, as already mentioned, the reddish look of an object given in perception is a property that can in principle be dissociated from the enabling effects of seeing something red; for short, it is an 'effect-independent' or, as is sometimes said, 'intrinsic' property of the perception (Cf Shoemaker 1994, 22). Second, it is an effect-independent property that is manifest for perceivers, in the sense of being registered as such: perceivers see the object as having the red look—they don't just see an object that, unnoticed by them, has a red look—if it looks red to them. And third, it is a manifest, effect-independent property that manifestly enables perceivers to display those capacities associated with perceiving redness: to sift and sort and track red objects among the items given in perception, or just perceptually remembered or imagined, and on that basis to ascribe redness and related properties to them. The property will manifestly enable them to do this, in the sense that they see it as supporting those capacities. Not only do they see the red look as having such and such an effect-independent character, they also see as inviting relevant contrasts and comparisons: they make those contrasts and comparisons as responses that the look extracts from them; they don't just find themselves disposed to make them, they know not why.

The reddish look postulated, then, is an effect-independent property of what is given in perception; it is manifest for the subject, being registered as such; and it manifestly enables the subject to sift and sort and track perceived or remembered or imagined things in certain ways, being registered as a means for performing such activities. This can all be captured by

saying that the reddish look is a *quale* of the visual experience, for *qualia* are typically conceived of as effect-independent properties that are manifest as such—known in their essence—and that manifestly support sifting, sorting, tracking and related capacities. As David Lewis says: 'Folk psychology says, I think, that we *identify* the qualia of our experiences. We know exactly what they are—and that in an uncommonly demanding and literal sense of "knowing what".... It is by producing this identifying knowledge that a novel experience confers abilities to recognise and imagine' (Lewis 1995, 141).[6]

How satisfactory is the *qualia* theory of looking red? It is certainly satisfactory in explaining how the red look of red things can identify the nominal essence of redness. We can easily understand that while people may have no direct access to redness in its essence, it will be available and denominable for them, so far as it presents itself via the sort of *quale* postulated, at least when things are normal. Such a *quale* can easily be cast as the means or mode of presentation that redness has for ordinary perceivers and that enables them to identify the property of redness in objects.

But the *qualia* theory is less satisfactory on other counts. The main problem is that if we are to adopt the theory, then we must buy into an anti-physicalist picture, according to which there are at least some properties of the actual world—the *qualia*—that are not fixed in place by the way the world is physically: say, by the way the world is in its microphysical configuration (Pettit 1993). Many people will be happy to endorse such a picture but many again, myself included, won't. And in any case it is a defect in a theory of what it is for something to look red that it carries such heavy baggage. It would be better to have a theory that doesn't entail the truth of anti-physicalism—or, for that matter, the truth of physicalism.

Why do *qualia* commit us to anti-physicalism? The core reason is that *qualia* themselves count as non-physical, so far as they fail to satisfy a plausible condition on causally efficacious, physical properties: that while their essence may be divined on the basis of various effects, in particular various observed effects, the essence itself cannot be revealed or manifested in observation. Causally efficacious, physical properties are bound to have a hidden structure or grain, as David Lewis (1995, 142) puts it. And *qualia* are conceived in such a way that they don't: they are supposed to make themselves manifest in a way that no efficacious, physical property could conceivably do.

We might think my colour *qualia* will be available to me so far as they cause things to be a certain way with me: that they will be available to me via their perceptual effects. But this would be mistaken. The colour *quale* is supposed to become available to me, and available as such or in its essence, so far as the red object perceived or the perception of that red object has an effect on my senses. It is the red object, not the *quale*, that is seen in the ordinary process of perception. The *quale* is supposed to become manifest in

the wake of that perceptual effect in a very different sort of epiphany. If we were to try to invent properties that resisted physical accomodation, we couldn't do better than *qualia*.

I say that this is the core reason why positing *qualia* involves rejecting physicalism. There is a further, associated reason, however, that is also worth mentioning, if only because it may be more immediately obvious. This is that if we admit *qualia*, then we will find it hard to resist those modal and epistemic intuitions which are invoked to give sustenance to anti-physicalism.

One modal intuition is that *qualia* might be switched as between different colours, or might vary between individuals, without there being any recognizably physical difference present: in particular, any difference in the sifting, sorting and tracking performance of perceivers. And another is that, assuming such performances are fixed in place by physical antecedents, *qualia* might be entirely absent without any functional or physical difference (Chalmers 1996). It is going to be very hard to resist such intuitions—and so to resist anti-physicalism—so long as *qualia* are admitted. Q*ualia* are tailor-made to support the claims involved.[7]

The epistemic intuition that is invoked to sustain anti-physicalism is best known from Frank Jackson's (1982; 1986) thought-experiment with the omniscient scientist, Mary. We are supposed to imagine that Mary knows all the physical facts there are to know but that she is confined to a black and white room. And then we are invited to ask whether there is any fact about the way the world is, marking it off from ways it might have been but isn't, that she would discover on being released: any fact such that, being previously unknown to the physically omniscient Mary, it would have to count as non-physical. If there are *qualia* then it follows immediately that there will be such a fact. She will discover that red things have the particular *quale* they have, and not any of the other possible ones—they have the reddish look, not the greenish—and, since she could not have known that they had that look in the black and white room, this fact will have to count as non-physical.

To sum up, then, the *qualia* theory of looking red is satisfactory in phenomenological terms, so far as it would explain how redness becomes a salient, denominable property on the basis of this mode of presentation, but it is decidedly unsatisfactory in committing us to very heavy metaphysical baggage. I think that we would do well, then, to move on and to look for alternatives. I do this in the three sections following.

3. Towards an alternative approach

In discussing the *qualia* theory, we saw that the *quale* of red is supposed to explain people's capacity, on seeing red, to sift and sort and track red

objects and, on that basis, to make ascriptions of red. The alternative approach that I wish to examine starts from this fact that whatever else looking red is thought to involve, looking red means looking fit to underlie that capacity. The approach explores the possibility that not only is this part of what is involved in an object's looking red; it is the sum total of what is going on (Harman 1997).

This alternative holds that there is no effect-independent, reddish look such that when an object looks red it has that look and that look manifestly gives rise to the effects that enable a subject to sift and sort and track appropriately, and on that basis to make appropriate judgments. Rather what happens is simply that the object looks the way that anything manifestly giving rise to those effects would look. The way the object looks has no character that we might imagine being dissociated from the enabling effects, being present in their absence, or absent in their presence. It has a character only as something that manifestly enables the subject to sift, sort and track in a certain way, and thus to make corresponding judgments; it has a character that is essentially tied to those empowering effects.

That a seen object manifestly enables me to do such things means that I see it, rightly or wrongly, as enabling me in that way. The contrast is with the imagined case where I find or think that I have such capacities but have no immediate sense of where they come from. In such a case I may manage to judge and perhaps in a sense to see that the object enabled me to do those things. But I will not see it enabling me—see it as enabling me—to do them. The difference will be like the difference between seeing that the hand of the clock has moved and seeing it moving or as moving. As there is no deep mystery about how I may come to see the hand of the clock moving—it just has to move fast enough—so there need be no mystery about how I may come to see an object enabling me to sift, sort and track it in various ways: that is, about how it may manifestly enable me to sift, sort and track it in those ways.

The line suggested on what it is for an object to look red can be made a little more vivid by recourse to an analogy. Consider the way a ball looks when it looks like it's going fast. Is there an effect-independent way it looks such that you might imagine that look being absent—that 'fastish' looks, as we might say—when you remain visually inclined to judge that the ball is going fast, or being present when you become visually inclined to judge that the ball is moving slowly? Surely not. All that happens is that the ball has a look that is essentially tied to the effect of inducing in you the judgment 'It's going fast!' and, no doubt more primitively, certain reaching and ducking responses (Pettit 2003).[8]

The idea in this approach to looking red is similar. Just as there is no effect-independent way that the ball looks when it looks like it's going fast, so the theory holds that there is no effect-independent way that an object looks when it looks red. The way it looks is exhausted in the character the

perceived object has as something that manifestly gives rise to certain effects. The effects in this case are those that underlie your capacity to sift and sort and track it in a certain pattern and, on that basis, to make the judgment that it is red, or is a certain shade of red, or is redder or brighter or more vibrant than something else, or whatever. The object looks red so far as it manifestly enables you to sift and sort and track it in the red-appropriate manner, and so to make corresponding judgments; it looks red so far as you see it as extracting those responses from you.

I said in the last section that on the *qualia* theory colour-looks are effect-independent properties of what is given in perception that are manifest to the subject as such—and so known in their essence—and that manifestly but contingently induce various effects. On the line sketched out now, colour-looks are necessarily connected with the effects whereby the seen object makes appropriate sifting, sorting, and tracking performances possible, and are manifest to the subject just so far as the seen object manifestly induces those responses: just so far as the object is seen as making those responses possible.

The ball that someone throws looks to be going fast so far as it manifestly elicits reaching *there* if I am to catch it, or ducking *now* if I am to avoid it. There is a way it perceptually presents—looking fast—in virtue of the effects it manifestly elicits. My picture is that similarly there is a way a red object perceptually presents—looking red—in virtue of the effects, associated with sifting, sorting and tracking, that it manifestly elicits. The object looks red just so far as it lends itself manifestly to those forms of discrimination. It looks red just so far as it is manifestly discriminate or discriminable in the dimensions associated with sifting, sorting and tracking responses.

Where a colour *quale* has an effect-independent character, then, the look of a colour on this alternative approach is a property whose essence is tied up with the effects that the perceived object has in manifestly enabling the subject to make appropriate sifting, sorting, and tracking moves. For something to look red in perception will be just for the object perceived manifestly to enable those responses; it will not involve the perception in itself instantiating anything like a *quale*. The fact that the perceived object has a red look will come to nothing more or less than that the perception plays a suitable empowering role: that it has the active power associated with playing that role.

It is important to recognise that it is only the object perceived, or the perception itself, that can be said to enable the subject to make those responses. For the look of the object perceived, being necessarily tied up with those effects, cannot relate to them in the manner of a contingent cause. The cause of the effects will be the experience—ultimately, the object of the experience—and the causally relevant properties of the experience will presumably be properties, say neural properties, to which the subject has no access. That the perception has the manifest, active power associated

with the perceived object's looking red just means that the perception manifestly has such effects; to say that it exercises that power is to say that it has those effects, not to explain the effects by reference to the power.

Consider a question analogous to Socrates's question in the Euthyphro, as to whether the holy is holy because it is loved by the gods, or whether it is loved by the gods because it is holy. Does something look red because it manifestly enables people to make sifting, sorting, and tracking moves of a relevant kind? Or does it enable people to make those moves because it looks red? The view of looks as the manifest powers exercised by experience opts for the first line. The object will have its enabling look in virtue of having the effects, not have the effects in virtue of having that look. The *qualia* theory would go the other way, holding that a colour experience will have its manifest effects in virtue of having the appropriate colour *quale*, not that it will have the *quale* in virtue of having the effects.

Does the view that looks are of this kind make the look of something when it looks red epiphenomenal? Does it mean that while the look is caused to come into existence by the effects that the experience manifestly makes possible, it does not itself cause anything? Not quite. The look, understood as a manifest, active power, does not cause anything, as we have just seen. But neither is it caused to come into existence by the enabling effects. Rather it supervenes on those effects, in the way that the shape of a *pointilliste* drawing—an image composed out of dots—supervenes on the positions of those dots. Keep the dots the same and the shape will remain the same; and this, as a matter of metaphysical or logical necessity, not of causal contingency (Pettit 1994; Pettit 1995). Keep the manifest enabling effects the same, and equally the look or power will remain the same. Do enough to secure those effects, and the look will come for free. Coming for free in virtue of the way the effects materialise, of course, the look will be just as physical as those effects themselves. It may be causally inefficacious but it will not be the sort of non-physical thing that epiphenomenalist pictures have traditionally countenanced.

On the theory that reduces looks to powers, then, the red look of an object is causally irrelevant to the enabling effects of the perceived object. This puts the theory in tension with received intuition. It is very natural to think that how something looks to us in perception is what causally explains the responses we make to it, as we sift, sort, and track it, judge it to be red or whatever. Thus Charles Harris (1962, p. 3) writes: 'a great many human actions are preceded by perception, and it is commonly believed that such actions are, by virtue of the preceding perception, essentially different from others, the so-called ''unconsciously motivated'' actions. It is assumed that the former are ''guided'' by perception while the latter are not. Indeed the truth of this proposition appears self-evident.' Notwithstanding the self-evident character, however, the view of looks as powers is forced to reject this proposition, as indeed Harris himself rejects it.

But however counterintuitive, the rejection of that proposition is not outlandish. The idea is that perceptual exposure to a red object tunes us in a way that enables us to sift, sort, track and so on and that this tuning occurs 'behind our back'; it occurs in virtue of the brain's responses to the perceptual input at a subpersonal level. What we become aware of in the experience of something red presupposes that those subpersonally induced responses are in place; the red look of the object is the look it has so far as the perceived object is registered as enabling—as having already enabled—those responses: so far as it is registered as having that active power.

Even if this runs against our natural intuition, however, there is no mystery here: nothing that might not make good sense in the light of what we know about how the brain works. There are many effects that perceived objects have on us, such that while we are not aware of them, they still show up in the adjustments we make and the associated actions that we adopt; the brain does various things for us behind our backs (Gaizzinga, Ivry et al. 1998). Not only are there cases where perceived objects produce effects in advance of their being perceived as having any particular character, as in our construal of colour perception. There are even cases where the effects of perceived objects are anomalous in light of the character that we take those objects to have. While reporting in certain visual illusions that one object looks bigger than another, for example, people adjust their grip in the same way when they reach out to pick up those objects (Milner and Goodale 1995). This being the case, we should not fight shy of a theory that has to ascribe effects to colours that are not produced by the ways colours look but serve rather to underpin those appearances.

4. Developing the alternative

It is one thing, however, to sketch the idea for an alternative to the *quale* approach; it is quite another to develop that alternative in a story about the precise responses that colours occasion in us. I try to do that in this section, aiming to make the alternative, looks-as-powers theory as vivid and persuasive as possible. Then in the final section I sketch some advantages that argue in favour of the approach.

There are two constraints that any plausible elaboration of the powers approach will have to meet. The first is that it must be able to point us towards a range of colour effects rich enough to make it plausible that anything which has those effects is going to look red; it should become difficult to imagine the effects attending something that had a different look or to imagine the look having different effects. And the second constraint, which may seem to pull in the opposite direction, is that the range of effects must be unified enough to serve as a way in which redness gets to be made discernible: a way in which red things get to present themselves to ordinary

folk as being of a single, denominable kind. I shall try to elaborate my version of the approach by looking at how it can be developed so as to meet those two constraints.

First constraint

Up to now I have spoken of the effects that enable an observer to sift, sort, and track a red object—to discriminate it on the basis of colour—and so to make the judgment that it is red or red of a certain shade. But folk psychology does not see much complexity in the discriminatory effect or effects associated with sifting, sorting and tracking performances. And this may help to explain the appeal of *qualia* theory. For to the extent to which the discriminatory effect associated with something's looking red is simple, it is going to be intuitively plausible that while continuing to ground discriminability, the look of red might vary in one or another independent manner. It is going to be intuitively plausible, for example, that red might continue to ground the required discriminability and have the look of green, while green gets the look of red.[9]

But if folk psychology supports the idea that the discriminatory effect of seeing red is simple—in particular, simple enough to support the logical dissociability from the character of the red look—then it is misleading. For the idea does not survive reflection on the lessons of colour science (Thompson 1992; Akins and Hahn 2000). These underscore the complexity and richness of the looks-red, discriminatory effect and make it plausible that each colour will have its own characteristic suite of effects, with red objects supporting capacities to sift, sort, and track that nothing which looked green, or looked any other way, could sustain.

In order to be sensitive to colour, as I read the scientific findings, three things are necessary (I draw on the sort of work that is well represented in Byrne and Hilbert 1997, Vol 2).[10] First, our brains must be sensitive to the intensity of light, recognising variation in illuminance—say, as between noon and dusk. Second, they must be sensitive to wavelength of light, being able to discriminate different colour-associated wavelengths, even as the intensities vary in different ways; this involves the brain in comparing the impact of a light source on different types of cones. And third, our brains must be sensitive to the differential powers of different surfaces to reflect different wavelengths of light in different ratios: that is, to their different surface spectral reflectances, or reflectance profiles.

This third achievement is fairly remarkable, for it enables us to pin colours on objects, tracking objects fairly reliably on the basis of colour across different intensities of light (Broakes 1992), against different backgrounds, and from changing viewpoints; the viewpoints will change as we move our bodies, turn our heads or rotate our eyes. And from an evolutionary point of view, the achievement is presumably quite basic, since

colour vision is hardly likely to be of great utility—colour vision, as distinct from sensitivity to light—short of enabling us to do such tracking. The hunters who track an animal on a wooded savannah are going to be enormously helped by being able to code it by colour, identifying it as it moves in and out of trees, against foliage of different colours, and as they themselves move in relation to it. The gatherers who are searching for ripe fruit are going to be at a loss unless they can code it by colour in the same way, seeing how it stands out from different backgrounds, viewed at different angles, and in conditions of shifting light and shade.

This third, remarkable achievement of the brain itself involves three distinct capacities.

- First, the capacity to mark local edge contrasts in surface spectral reflectances, though not as such: the ability to localise a sudden transition in the visual field between one colour and another; this is due to the operation of double opponent cells which are excited by red (green) and inhibited by green (red), for example, or excited by blue (yellow) and inhibited by yellow (blue).
- Second, the capacity to see, not just the contrast in a given context between a green object Y and two red objects, X and Z, on either side of it, but also the similarity between X and Z; this requires integrating the edge contrasts: calculating how X and Z compare, given the contrasts with the intervening Y.
- And third, the capacity to standardise different contexts so as to be able to see, not only the similarity between X and Z, for example, but the similarity between those two objects and a red object in a visually different context. This standardisation is accomplished, roughly, by taking the whitest point in each context as the point of reference; normally, the whitest points don't vary greatly across contexts, so that while it is subject to occasional error, the procedure will generally work fairly well.

These well established findings should bring home to us the fact that there is much more involved in something's being discriminably red than common ideas would suggest. Colours meet the eye only in virtue of a highly complex registering of intensities and wavelengths of incident and reflected light, and in virtue of a highly complex registering, integration and standardisation of the contrasts displayed by various objects in the ratios at which they reflect different wavelengths.

Just to illustrate the need to keep the science in mind, consider this feature. It may seem to common sense, as suggested earlier, that if X and Y contrast as red and yellow and Y and Z contrast as yellow and red, then X and Z are bound to stand out as both being red; they are bound to be discriminably red. But this is just not so. One reason why it is important to

distinguish between registering contrasts and integrating contrasts, as in the above account, is that there can be selective impairment of the capacity of the brain to integrate contrasts. The effect involved in the registering of a contrast, then, is quite distinct from the effect involved in registering a commonality: in comparing two objects and finding them to be of the same colour; these two aspects of discriminability can come apart.

And not only is that so. Selective impairment, as described in some recent work, even suggests that people who can register contrasts—they can pass tests which show that the contrasts register with them—do not see colour if they fail at the integration and standardisation levels. There is evidence that total colour-blindness or achromatopsia can be occasioned by a breakdown even at this very high level of information processing (Kentridge and Heywood 2002). This is not really surprising, of course. For how could someone count as being able to see the colours, if they could detect contrasts but were unable to mark any commonalities: if they had only that limited capacity to discriminate? Things will look red to us only insofar as they look to have common as well as contrasting colour reflectances—properties that are stuck to those objects; the contrasts can show up, and confer a restricted range of discriminatory skill, as this research indicates, without colour itself making an appearance.

As we become aware of just how rich are the effects occasioned in us by colours, it must begin to seem more plausible that something that had all those effects could not vary in any other, manifest dimension while continuing to have the effects, or *vice versa*. It must begin to seem plausible that something's looking red may consist in its manifestly enabling the effects involved in discriminability and that nothing that looked any other way—say, nothing that looked green under a red-green spectrum inversion—could have those effects, and that nothing that had those effects could look any other way.

Consider just how varied and demanding are the effects associated with something's looking red:

- its being distinguishable from objects of other colours, and other shades—adjacent and at a distance—across varying illumination, against changing backgrounds, and from changing viewpoints, and of course despite differences in texture and associated properties;
- its being classifiable as an object of the same colour or the same shade as another object, whether an object at a distance in the same context or in another context altogether—and this, again, across the variations mentioned, and despite differences in texture;
- its being trackable over time, on the basis of its colour, under those variations: as it moves across different landscapes, for example, as it moves into and out of full light, and as the angle of observation shifts;

- its being discernibly different under changes of lighting or background or angle of vision—different in a way that will help to inform the observer about those changes—while remaining distinguishable, recognisable and trackable in the ways mentioned (Broakes 1992).

Can we really imagine that something might manifestly enable such an extensive range of effects and yet vary in some other dimension such as that which a would-be *quale* would provide? Or *vice versa*? I think not. Can we imagine, for example, that the red object that is made to look green under a spectrum inversion would have the same signature in the space of effects as it always had? Surely not. As the lighting varies, for example, we may expect that the object giving off looks-red effects will be discriminable from certain backgrounds in a way that an object giving off looks-green effects would not be, and the other way around. The effects associated with redness and with other colours are rich enough in each case to suggest that every colour will sustain its own distinctive suite of effects: it and it alone will manifestly elicit the responses involved.

Second constraint

So much by way of meeting the constraint that the looks-red effects—the effects involved in making red objects discriminable—should be rich enough to undermine the intuition that the way red looks is logically dissociable from the effects that redness is required to have on us. The second constraint we have to meet is that, however rich, the effects in question must be unified enough to serve as a mode of presentation for the property of redness—the property that they are expected, by the story in the first section, to make discernible and denominable.

This constraint is fulfilled without difficulty under the *quale* account. For whenever something looks red it produces the same *quale* in the observing subject, a *quale* that is then said to underpin more specific effects in sifting, sorting, and tracking capacities. But on the looks-as-powers account, things look more problematic.

Suppose that you design and construct robots to be susceptible to all the discriminatory effects of colour that we documented, and to be like us in how this is done and in their general mentality. They undergo precisely the same effects, via the same mechanisms, and, so we may posit, have our sort of intelligence and discursive ability.[11] Thus the robots are reliably tuned, now in this context, now in that, to discern the contrasts and the commonalities associated with redness and to track objects displaying continuities in redness. Will this ensure, on its own, that the property of redness is salient and denominable for them?

A little reflection should make clear that it will not ensure this. For why should those creatures ever make a linkage between the redness property

that serves in the morning to mark off the ripe tomatoes from the unripe ones and to make them look similar to the apples; the redness property that later picks out the post box at the end of the street and that enables them to track it as they drive down the road; and the redness property that characterises the jockey that they track in their binoculars at an afternoon visit to the race course? In each context the redness property will have a useful effect in highighting contrast, commonality and continuity, or at least some of these discriminatory features, but there is no reason that we have been given so far, why the creatures we are imagining should see the property in question as one and the same property, and introduce a word to designate it.

If it is plausible that without having access to a *quale*, we human beings manage to have a single, recurrent property made salient to us in contextually variable complexes of sensitivities, then there had better be something more that the property does for us than just to occasion those distinct sensitivities, now here, now there, now at this time, now at that. The complexes of sensitivities had better have a unity for us, such that we are naturally directed by them to what we see as a single property, now realised in this object, now realised in that.

Where to find the required unity? The answer I propose is that despite the diversity we have been emphasising, there is one common sensitivity—or better perhaps, meta-sensitivity—that any experienced subject will presumably develop in visual response to instances of red. In every instance where something looks red, the subject will be enabled to fasten on a contrast, commonality or continuity proper to that occasion; the subject will instantiate a particular discriminatory effect. But in addition to this discriminatory sensitivity, the subject who is experienced in exposure to colour will presumably form an expectancy that that object will give rise to corresponding discriminatory sensitivities in cases of different kinds.

Consider what happens as I become habituated in the perception of a colour like red. I discriminate a red object from non-red ones on a particular occasion, let us say, relying on the sensitivity that redness manifestly gives me. But as I do that, becoming exposed to a particular colour effect, I will tend to find that other effects routinely materialise in its wake: that very object is discriminable, not just from other objects in the same scene, but from objects in different scenes too; that very object presents itself as discriminably similar—similar in a colour way—to a distinct object in the same and in other scenes; that very object remains discriminable on a colour basis, even as it moves against a background of different colours, even as the lighting shifts, and even as I change my own position; and so on. So far as colour sensitivities come in packages of this kind, it is plausible to think that as an experienced perceiver of colours I will tend, on instantiating any one complex of sensitivities to redness, to form an expectation, for various ways in which circumstances might change, that the red object in question will give rise to corresponding, associated sensitivities.

If this sort of story is sound, then while the red property may have quite a different, discriminatory effect, now in this situation, now in that, it will reliably induce a disposition to expect—an expectancy—that it will confer a characteristic suite of sensitivities under different circumstances. The red object will present itself, then, via a robust, stable effect occasioned in the suitably attuned observer on every exposure to it. However it activates the observer on any individual occasion—whatever response it tunes the subject to have—the subject will be primed to have the same expectancy in each.

Under this final version of our story, then, redness is a property that makes itself felt—that gives off the look of red—so far as it is assigned to an object on the basis of a manifest discriminatory effect and so far as it manifestly induces, via that effect, an expectancy as to how the object will show up under a range of possible variations. The person who sees something as red—the person for whom an object looks red—will be disposed automatically, for any such variation envisaged, to expect that it will show up as required. And the person will see the object as red precisely insofar as he or she sees it in a way that manifestly sustains such expectations.[12] Something will look red, in other words, if and only if it looks characteristically discriminable and looks fit to remain discriminable under a characteristic range of conditions: the conditions for which obervers are primed to have expectations.

The effect of this final articulation of the powers theory is to introduce a further level of explication to the approach. That something looks red in a given context does not just mean that it manifestly enables the subject to sift, sort, and track that object in the given context. It means that the object manifestly enables the subject to sift, sort and track it appropriately in that context and, as the subject expects, in an open-ended range of other contexts too.

This level of explication brings the powers theory of colour-looks into line with a standard view of the look, say, of a three-dimensional object like a cube.[13] When a cube looks cuboid to me then it manifestly enables me to pick it out in a distinctive way from my present perspective and, as I expect, from an open range of other perspectives too. The cube will not look cuboid to me, for example, if I expect it—expect it in a way that perception makes manifest, not just intellectually—to have a non-cuboid appearance from behind; in that case, it will look like a two-dimensional shape of some kind, or whatever.

Under the powers theory, something very similar holds.[14] When something looks red to me it manifestly enables me to pick it out appropriately in the given context and, as I expect, in an open range of other contexts too. It will not look red to me, for example, if I expect it—again, in a way that perception makes manifest, not just intellectually—to have a non-red appearance as the lights go up; in that case, presumably, the object will

look like it sustains a certain shimmering effect of red light, or something of the kind.

Three other sorts of look

Grant, then, that something looks red—has *the epistemic, perceptual look* of red—so far as it manifestly enables me to sift, sort and track it appropriately in given conditions and, as I expect, in an open-ended range of other conditions. This formula helps to identify three other sorts of colour look and it may be useful to itemize these briefly. They each answer to a variation on the formula.

A first variation drops the word 'manifestly', so that the object is said to enable me to sift, sort and track it appropriately in given conditions and, as I expect, in various other conditions. The look that materializes when this happens is *the functional look* that we distinguished in the introduction from the epistemic look: this is the look that something has so far as visual exposure elicits the belief that it is red, independently of collateral beliefs. The feature of the functional look is that it is not necessarily a look of which the subject may have any awareness as such. That something has the epistemic look of red for me is consistent, of course, with its also having the functional look of red. And an object may have that sort of functional look in a case where no epistemic look materializes: this will happen when I am not alert, as we might put it, to how an object looks but do spontaneously form beliefs about its colour in response to visual exposure.

A second variation stipulates that though I do maintain the expectation mentioned in the formula, it happens not to be sound. The object manifestly enables me to discriminate it appropriately here and, as I expect, in other contexts. But actually I am wrong; let other contexts materialize and I will be unable to discriminate it. I call this *the illusionary look*, since in the case envisaged the object that looks red does so, not because it is red, but because of a context-specific illusion. That a look is illusionary in this sense, of course, is consistent with its being also a functional and an epistemic look. It is a real look that something has for me, whether epistemically or just functionally, but it is a look that proves misleading in the expectations it supports.

A third variation, however, is more radical. It involves my rejecting the expectations altogether, as might happen if I became aware that a look was illusionary. In particular, it involves my rejecting the expectation at a level that penetrates beyond intellectual judgment to perceptual processing; it will not be enough if I just reject it in the way in which I reject the judgment that the lines in the Mueller-Lyer illusion are of different lengths. In this case, as suggested above, I don't think that the object will continue to look red, but will present the look of something related: an object with a shimmering, red-like appearance, or whatever. Call this *the truncated look* of red.

Do coloured objects ever have such truncated looks? Or, for that matter, do three-dimensional objects like cubes ever have truncated shape looks: say, the looks of two dimensional shapes like trapezoids? Presumably, artists must become capable of letting objects assume such looks—such epistemic looks—if they are to paint the objects in true perspective or, as we say, in their true colours. There is no difficulty here for the powers theory, provided it is recognized that when an object has the truncated look of something red or cuboid, it does not look red or cuboid as such. The irony of artistic representation is that in order to make things look red or cuboid in their paintings, artists must train themselves to see them in other terms: not as red or cuboid objects, but as strangely shimmering surfaces or curiously shaped planes.

5. Some advantages of the powers theory

First advantage

The most obvious advantage of this way of construing what it is for something to look red, or to look any other colour, is that it does not raise the same complaint as the *quale* story, being much more economical than that better known alternative. The *quale* story would force us to countenance entities that escape physical determination, thereby requiring us to reject physicalism, whereas this story would not. On this account there need be nothing more involved in something's looking red than the object's having certain enabling effects. And there is every reason to think that such effects materialise on a purely physical basis.

But the economical nature of the story in this respect has a further aspect. While it does not force us into being anti-physicalists, it does not require us to be physicalists either. Consistently with the account given, we might still think that there are non-physical aspects or episodes in our mental lives. It's just that the nature of colour perception won't force us into that rather extravagant view of the world.

Although it does not force us to be physicalists, however, the story does fit very well with physical theory, in particular evolutionary biology. J. D. Mollon argues on the basis of various examples that in evolutionary terms colour vision was probably of the greatest importance in gathering fruit, in hunting prey and in other such basic activities (Mollon 1997; Mollon 2000). He sums up some of those lessons thus: 'A primary advantage of colour vision is that it allows us to detect targets against dappled or variegated backgrounds, where lightness is varying randomly' (Mollon 1997, 382). This sort of claim is entirely unexceptional from our point of view, since according to the story presented, for objects to look red or to look any other colour is precisely to look the sort of way it would be evolutionarily advantageous to have them look.

Qualia are bound to appear as freakish posits—visitations from another regimen—within the discipline of evolutionary thought. Not being physically fixed, they cannot have been selected for their adaptive advantage; yet if they serve to underpin discriminatory capacities, then they are advantageous in that way. Our story faces no such difficulty. It postulates nothing more in the character of colour perception—nothing more in the way that coloured objects look—than it would have been within the capacity of natural selection, and consonant with the way natural selection works, to have provided for us.

Second advantage

The second advantage of the looks-as-powers theory is that it helps to explain some of the epistemic peculiarities of colour appearances. First, it explains why appearances are diaphanous, as it is sometimes said: why we look through our experience to the red object perceived to decide if it is an experience involving a red look (Grice 1962; Harman 1990; Tye 1995). Second, it explains why they are properties such that in relevant observations we know them in their essence; there is no sense to the idea that we might not know the way looks essentially are. And third, it explains why they are properties such that we cannot generally miss them when they are present or register them as present—mistake them—when they are not.

Looks will be diaphanous, on the powers theory, because the issue of whether something looks red is just the issue of whether the object manifestly enables me to respond appropriately. It is not an issue to be decided by looking into the experiential state I display, then, as with an inner eye. It is a question to be decided, not by introspecting the state of awareness, but by attending more closely to the object of awareness. The point of the attention will be to see if the object proves to be red in the responses it elicits from me in a manifest way. If it does then it follows, as night follows day, that the perception to which I have brought attention to bear is indeed one involving a red look.

Looks will be knowable in their essence, on the powers theory, because the theory makes the essence of a look into something rather thin and insubstantial. An object will look red to me just so far as it manifestly enables me to sift, sort, and track it on relevant lines, and so I will be in a position to know all that there is to know about the red look when I am enabled to respond in that way. Looks will not be non-physical in the manner of *qualia* but, being properties that supervene on suitable manifest effects, there will be nothing about them that is going to be hidden from me.

Finally, looks will be unmissable and unmistakeable to a suitably placed subject according to the powers theory. The fact that an object looks red is guaranteed to be so by my being manifestly inclined to make the red-specific responses, including the perceptual judgment that the object is red. To be

inclined to make the perceptually based judgment that the object is red, then, will be to show that it looks red, so that I can be as sure of its looking red as I can be sure of being so inclined; to know whether it looks red—and to know this unmistakeably—I need only ask how I am disposed perceptually to answer the question as to whether it is red. Furthermore, since any case where an object looks red to me will be one where I am inclined to make that judgment—even if I inhibit the inclination in view of learning, say, that the lighting is strange—the tendency to make that judgment will surface as a sign of the look's presence: the look will be unmissably as well as unmistakeably there.

Third advantage

I have been arguing that the looks-as-powers story about colour appearance is economical, and that it enables us to explain some of the epistemic peculiarities of colour appearances. There are two other advantages that I would like to add. Like the second, they both have an epistemological character. The first is that the account sits well with the rejection, common among many philosophers nowadays, of the so-called myth of the given; it offers a plausible construal of how that rejection might be taken in the case of colour perception. And the other is that the account fits very comfortably—in stark contrast to the *qualia* story—with some empirical results that have been unjustifiably neglected in philosophical discussions of colour.

Wilfrid Sellars is famous for having identified and criticised the myth of the given and his achievement has been much hailed in recent philosophy (Rorty 1980; Brandom 1994; McDowell 1996; Sellars 1997). The broad idea is that nothing could be a more or less brute given, in the fashion associated with traditionally conceived sense-data, and yet serve the purpose of non-inferentially justifying various knowledge claims: claims to the effect that something is red, for example, or even that it looks red. That it is a brute given suggests that it can be acquired without training; that it serves non-inferentially to justify knowledge claims suggests that it is not. This idea is not without its ambiguities and it is by no means uncontested (Bonevac 2002). But one nice result of our discussion here is that we can see a sense in which it is true.

On the powers theory, there is nothing associated with an object's looking red that has a manifest, effect-independent character; anything of the kind would count as a *quale*. And more generally, there is no brute given. What is available to observers when something looks red is available by virtue of the sort of exposure and training needed for the emergence of discriminatory tuning and expectational priming. It should be no surprise, then—and it should certainly not be paradoxical—that what is available is enough to justify knowledge-claims in a non-inferential way. The

approach taken here fits very comfortably with rejecting the myth of the given.

The hold of that myth may come from the natural assumption that an argument of the following kind is sound.

- If a person, say Mary, is caused by what she perceives to judge that something is red, then there must be an effect-independent property of the perceptually presented object that causes her to make that judgment; under fairly standard assumptions (Smith and Stoljar 1998), things have such causal effects only in virtue of their effect-independent properties.
- One possibility is that the property that leads her to make the judgment is an effect-independent property of the object, or the object-*in-situ*, that she does not perceive in its essence: say, its spectral reflectance; this would be a property that registers with her only via its effects. But the possibility appears to be ruled out by the following line of thought.
- The person will be able to inspect what she experiences more closely to see if the ascription of redness to the object is really well supported: to see if it continues to be reliably prompted and presumptively justified, as she pays more attention, changes the lighting, moves about appropriately, and so on. And this inspectional exercise appears to presuppose that there is a property that is there for the subject to identify independently of the effect whereby it leads her to ascribe redness.
- This property would constitute something that is given, in the sense associated with the myth of the given: something that the observer can contemplate in itself, reserving any tendency to make the judgment that it might be expected to support.

But the foregoing discussion will make clear how we should respond to this line of thought, and vindicate a picture that fits with Sellars's perspective. The line of thought sketched at the third stage is simply misconceived. If something's looking red conforms to the image described in this paper, then there will indeed be a property—say, the spectral reflectance of the object—that accounts for the effects on the observer in the context of suitable lighting, suitable surrounds, suitable access, and a suitable brain. But there will be no effect-independent property that is manifest in its essence to that observer.

The object will look a certain way but that look will exist just insofar as the observer responds appropriately to the object; it will supervene on those responses. True, the subject will be able to inspect what she sees more carefully, adjusting the lighting, the background, the perspective, and so on. But this does not involve eye-balling any manifest, effect-independent property more

carefully. It simply involves giving the coloured object the space required in which to work its magic—to have the effects that should be expected of an object with the ascribed colour—and to establish its title to be regarded as truly red. I expose myself to the object in suitable lighting. This object elicits various effects in me, via a subpersonal level of interaction. And so far as those effects materialise, I see the object in a corresponding way: as red, as a certain shade of red, as redder than this or that other object, and so on.

Fourth advantage

The final advantage of the looks-as-powers account that I wish to mention is that it fits very nicely with some empirical results. These are the findings of Ivo Kohler and some other researchers about the effect on the perception of colour of habituation in the wearing of distorting glasses (Kohler 1961; Taylor 1962; Kohler 1964; Harris 1980). Such experiments have not been conducted much in recent times—due perhaps to new ethical and legal strictures on research protocols—but Kohler's results are in line with some earlier and some later work.

What Kohler and some other researchers did was to get people to wear spectacles that were distorted for colour perception and to see what happened. In one case, for example, the left side of each lens was coloured blue, the right side yellow; in another the upper part of each lens was coloured red, the lower part green (Kohler 1964, 42–44). This sort of experiment complemented other experiments in which the spectacles were designed to switch right and left in the visual field, or up and down, or in which they had the effect of distorting the perceived shapes of things.

The finding in the colour case, which fitted fairly exactly with the findings in the other cases, was that over a period—in the colour case a period usually of weeks rather than days—people came to adjust so that their judgments of colour were as reliable as ever and their dispositions to make those judgments were as automatic as they had been previously. Taking off the spectacles after that period, however, had an effect similar to the effect of putting them on in the first place. It caused people to report, for example, that there was a blue tint to the parts of the visual field they had been seeing through the yellow side of the lenses, a yellow tint to the parts they had been seeing through the blue.

How did people report that things looked to them in the domain of colour, once they had become habituated to the spectacles? For us that is the crucial question. Before coming to the answer, however, it is worth asking what the two theories we have been examining would predict.

Short of postulating an independently unexplained mobility in *qualia*, the *qualia* theory would naturally predict that after wearing the glasses for a suitable period, people would report that while the bluish and yellowish tints introduced by the glasses remained in place—while the distorted *qualia*

remained in position—they had now learned to be very good at allowing for the change in making judgments on the colour of things; they had learned to recondition their judgmental responses to the altered qualia. The powers theory would support a very different line, however. Assume that the brains of the observers must have become deeply attuned to the distortion, given the wholly automatic way in which people became disposed to ascribe colour. Assuming that degree of attunement, the theory would predict that after compensation had occurred, things would look to the obervers exactly as they had looked without the spectacles; there would be no distorted *qualia* to remain in place, once the colour-effects had been fully restored.

Which theory do Kohler's actual findings bear out? Without any doubt, the powers theory. The subjects all reported that once attunement had been established, things looked on wearing the lenses exactly as they had looked before the lenses were ever worn. 'In the course of the experiment', Kohler (1964, 42) writes of the blue-yellow case, 'both colours subjectively faded away'. This report on the part of the subjects was borne out in a clever test, using an apparatus in which subjects could adjust a colour wheel by pressing a button, and make it go predominantly blue or yellow, or fade to a neutral grey. After habituation in wearing the glasses—but not, of course, on beginning to wear them initially—subjects could make the wheel have a neutral colour by a level of adjustment in the use of the button—this was objectively measureable—that approached that which was sufficient before the experiment began (Kohler 106, 114).

Not only does this experiment support the looks-as-powers theory. The most obvious way of making sense of it also helps to reinforce the theory. J. J. Gibson (1964, 8) points out that in Kohler's experiments the 'light delivered by the spectacles to the eyes still carried information about the environment, but in an altered form. This information had not been destroyed, but only biased'. He takes the experiments to show that the brain could readjust and recover that information. 'A distorted view of the world, then, when produced by distorted spectacles, is not incurable'. And he argues that this occurred by virtue of something crucial to the experiments, and often ignored in laboratory work on vision: the fact that subjects could explore the environment by turning their bodies, their heads and their eyes in order 'to achieve an optimum of stimulation' (9).

But how, more specifically, did the readjustment take place? Gibson holds that in exploring a world where objects shift from blue to yellow, depending on position in the visual field, and where the assumption is that they couldn't be doing this in themselves—that there must be a distortion at work—the brain must adjust so as to leach out that distortion and see the objects as having an unchanging colour. He makes the point in explaining why, after taking the glasses off, a person would see an object as having a blue or yellow tint, depending on where it was positioned. 'It had to be so if

the subject, previously wearing blue and yellow filters in the left and right halves of his spectacles, were to see that thing as the *same* colour with his head to the right as with his head to the left' (11).

This account of Gibson's fits fairly well with Kohler's own explanations. He also assumes that the brain has a default setting, as it were, which requires a representation of the world in which certain simple and economical stabilities are maintained: objects are seen where they are found to be available to touch, of course, and whatever colours they are seen to have, they have independently of angle of vision. And he holds that that setting forces the brain to adjust so that appearances give information on a suitably stuctured world: 'in the process of adaptation, it is always the world with which we are familiar which wins out in the end. It does so in the interest of simplicity and economy' (Kohler 1964, 127–8).

How does the world win out, with the senses adapting so as to give acceptable colour information and, in the other cases, information on orientation and shape? How does the brain, as he puts it, rehabituate to the distorted information: renormalise that information, as we might say, so that it delivers a world that satisfies the brain's settings? His line is: by correcting its expectations in the light of experience of the distorted input—by coming to expect, say, that yes, with the spectacles in place one and the same object may shift in how it looks from different angles; by then forcing behaviour to track the corrected expectations; and finally, by having appearances fall in line with those expectations. 'Expectancies . . . were adaptive in character from the very start, since they kept the subject from being distracted when, for example, something which had just looked blue suddenly turned yellow' (Kohler 1964, 113). The build-up of these expectations appears to have induced the colour appearances to come into line, suggesting that how the world is presumed to be has a role in determining how it eventually looks to be. 'It was after these expectancies had been built up that the sensations themselves began to change' (113). 'When dealing with corrections of *expectations*, we are nearing the initiation of correct *seeing*' (152).

I do not deny for one moment that the *qualia* theory has an intuitive hold on us and that this grip is not likely to slacken just as a result of some scientific findings. But I hope that these results of Kohler's, so regrettably neglected in the philosophical literature,[15] will help to reinforce the other considerations mentioned, and push us in the direction of the powers theory, or in the direction of something in the same broad family.[16] The best hope of making good sense of how colour in an object looks is to recognise that how it looks is entirely a function of how it tunes discriminatory capacities within us and primes our expectations as to how the object will remain discriminable in other circumstances. It has nothing to do with with anything so ghostly and incredible as *qualia*.

Conclusion

This paper is an attempt in the area of colour vision to join forces with those who would 'quine' *qualia* (Dennett 1979) and to oppose so-called *qualia*-freaks (Chalmers 1996; Block 1997). Does the line taken suggest a general strategy for debunking the *qualia* illusion, as it seems to me to be? It doesn't offer any easy formula for doing so but it does identify a program that would be successful, I think, if it proved capable of persuasive implementation. The program involves five distinct steps and it may be useful in conclusion to sketch these.

1. For any would-be *quale* of ordinary experience, whether the experience be perceptual, proprioceptive, enteroceptive or whatever, find effects which that *quale* is normally expected to have—and to have manifestly—on the subject.
2. Identify the possibility that the object of the experience might have those effects on a subject, without doing so in a way that was manifest to the subject; this object would have a functional look or feel that paralleled the *quale*.
3. Detail what would be involved in that functional look or feel becoming manifest as such to the subject—becoming an epistemic look or feel—with the object of the experience manifestly giving rise to the effects in question.
4. Replace the *quale* postulated with the active, manifest power thereby detailed, arguing that such a manifest power would have features that made it into a plausible substitute for the *quale*.
5. Develop the story to take account of the illusions, hallucinations and other non-standard experiences that have been ignored, even for the case of colour vision, in this paper.[17]

Notes

1. The weak version of the functional condition could be satisfied, without any awareness: without the look being epistemic. A simple creature might be inclined by an experience, independently of collateral beliefs, to believe that something is red without that inclination necessarily prevailing; conditioning might have damped its effect. I shall not dwell on that possibility in this paper.
2. Notice that on this account a metamer, being something that looks red only under a particular variety of lighting will not count as red, even if the lighting in question counts as normal and the person involved is a normal subject. The reason is that the metamer will not be disposed to have the variety of effects associated with being red under other normal conditions.
3. On the explicitly dispositional story mentioned and rejected at the beginning of the section, the semantic value assigned to 'red' in descriptive semantics may be

either the disposition or the disposing property but in either case the foundational semantics will claim that it is beliefs on the subject's part about the dispositional character of redness that fix that item as the semantic value of the term.

4. Think of the difference between recognising someone as having a certain power over others, oneself included, in a capacity as manager or boss, and having an experience of that person—though perhaps without any abstract concept of the capacity involved—as they act in that capacity. That is analogous to the difference between seeing a property under a dispositional aspect and seeing it through a dispositional aspect.
5. Not being generally alert to the abstraction of which I speak, we the ordinary folk may assume that colour is an inherently simple, unstructured and homogeneous property, in which case it could not be a spectral reflectance or anything of the kind. That assumption is false according to the line taken here but no matter how deeply embedded in common sense, I think that it can be put right without any great violence to folk ways of thinking. The revision required would be like the revision involved in learning that nothing is solid in the presumptively traditional sense of solidity—subatomic theory undermines the belief in such solidity—and that we had better reconceive of what the property involves if we are going to stick with other aspects of folk talk and thought.
6. The claim that colour-looks are known in their essence should be distinguished from the claim—described by Mark Johnston (1992) as the Revelation thesis—that colours themselves are known in that manner. The line taken in section 1 is that colours, qua disposing properties, will be known in their nominal essence but not in their real essence.
7. Notice that the logical dissociability of the *quale* from enabling effects is distinct from the argument that as a matter of how our colour perceptions are actually structured, the spectrum could be inverted so that the effects of green go with red and the effects of red with green, for example, without this impacting on our ordinary sifting, sorting and tracking capacities. While the spectrum is not invertible in this sense, by all the evidence available, logical dissociability will stand if looks are *qualia* (see Hardin 1997). This point also comes up later.
8. Perhaps a good way to characterize the sort of power envisaged here, and later, is as a higher-order, dispositive property that consists in the experience's having lower-order properties that produce those effects. Why is it said to be a dispositive rather than a dispositional property? Because the power is understood in the sense of active, not just potential, power: it exists only so far as the effects are actually materialising. Why is it said to be a higher-order rather than a lower-order property? Because it is manifest, being recognised as such by the subject who is exposed to it; the lower-order properties responsible for the effects could not be manifest in that way.
9. The plausibility of this intuition may seem to be boosted by the common view that it is physically possible, not just logically possible, for such spectrum inversions to occur without the shift showing up in our performance. That view is certainly mistaken, however, and I do not discuss it in this paper. Thus C. L. Hardin (1997, 298–99) argues that each colour has a distinctive, non-invertible role. 'The details of the chromatic structural irregularities

prohibit putative undetectable interchanges of color experiences: small rotations of the hue circuit carry unitary into binary hues; interchanges of warm and cool colours carry negative opponent-channel activations into positive ones, and *vice versa*; interchange of yellows with blues exchanges dark blues and cyans with browns; interchange of reds with greens maps a small categorical region into a large one, and a large one into a small one'.

10. I benefitted enormously from two workshops on colour science that I attended. One, in the early nineties, run by Ian Gold at the Australian National University. And the other, associated the Tucson Consciousness Conference 2002, run by Robert Kentridge, with the support of Charles Heywood.
11. Why precisely the same effects, and precisely the same mechanisms? Because for different ways that creatures perceive the same properties, there may be a different phenomenology. Shape and depth will surely have a different phenomenology, for example, for those blind people who come to be able to see them via a prosthetic apparatus that works via inducing tactile sensations; see Bach-y-Rita, P. (1984). Colour—surface spectral reflectance, say—might induce quite a different phenomenology in creatures who were sensitive to it in different ways.
12. The observer may not expect, as we might put it, that in all those variations, the red object will show up in the requisite fashion; that suggests a very intellectual picture of the achievement involved. The story told requires only that the well-attuned observer will have to be disposed, for each of those variations that may be considered, to expect in a case-by-case way that the object will show up appropriately. It is in order to underline this case-by-case aspect of their competence that I speak of an expectancy—a disposition to form case-by-case expectations—rather than an expectation in the ordinary sense. This is to say, in traditional terms, that the expectation may be formed *in sensu diviso* rather than being an expectation *in sensu composito*. For other uses of that distinction, see Pettit (1998) and Pettit and Stoljar (2002).
13. I am indebted to Alva Noe for emphasising this point in conversations. See Noe 2002, 67–9.
14. What distinguishes it as a secondary quality from the cuboid shape? Not only are secondary qualities perceptually discernible—to a trained eye even a theoretical property like being cancerous may be discernible; they are also, in a certain sense, perceptually confirmable. To be perceptually confirmable in the intended sense will be to be confirmable in virtue of effects on one or another sensory modality, where the effects involved may not be themselves matters of observation: that is, to be confirmable in virtue of independently unobserved effects on a sensory modality. The fact that the effects are independently unobserved marks a contrast with the way that the effect of weight on a scale, or the effect of volume in the displacement of a liquid, or indeed the effect of solidity in resisting the pressure of a probing hand, is observable.
15. While Kohler's work, in particular his work on colour perception, is generally neglected among philosophers, Susan Hurley (1998) is a notable exception. She makes use of the summary of some of his colour results in Kohler (1961) and this prompted me to read the full account in Kohler (1964).

16. I associate the line I take, as mentioned in the introduction, with a number of recent approaches, including the so-called sensorimotor line associated with O'Regan and Noe (2002) (see too Noe 2002). I should note, however, that whereas that line suggests that only variations under motor adjustments matter to learning to see red, I have argued that many variations are relevant that are not within my motor control: variations in background and illumination, for example, as distinct from variations in the angle of vision that I can manipulate by rotating my eyes, turning my head or moving my body. It may be, however, as Noe has urged in correspondence, that variations under motor adjustments are primary in some sense.
17. This paper, which grew out of discussions of Pettit (2003), was initially prompted by a desire to convince Jack Smart that 'looks red' need not be 'dangerous talk'. See Smart (1995). "'Looks Red' and Dangerous Talk." *Philosophy* **70**: 545–554. I was particularly helped by exchanges with Victoria McGeer, Eric Myin, Alva Noe, Daniel Stoljar and Evan Thompson. I benefitted too from discussion of the paper after presentations in the Australian National University; the University of Michigan, Ann Arbor; the University of Wisconsin, Madison; and Princeton University. I am indebted in particular to comments from Mark Johnston, Sean Kelly, Jim Prior, Mark Schroeder and Bas Van Fraassen.

References

Akins, K. and M. Hahn (2000). The Peculiarity of Color. *Color Perception*. S. Davis. New York, Oxford University Press: 215–47.

Bach-y-Rita, P. (1984). The Relationship between Motor Processes and Cognition in Tactile Vision Substitution. *Cognition and Motor Processes*. W. Prinz and A. F. Saunders. Berlin, Springer-Verlag.

Block, N. (1997). On a Confusion about a Function of Consciousness. *The Nature of Consciousness: Philosophical Debates*. Ned Block, Owen Flanagan and a. G. Guezeldere. Cambridge, Mass., M.I.T. Press: 375–416.

Bonevac, D. (2002). "Sellars Vs the Given." *Philosophy and Phenomenological Research* 64, 1–30.

Brandom, R. (1994). *Making it Explicit*. Cambridge, Mass., Harvard University Press.

Broakes, J. (1992). The Autonomy of Colour. *Reduction, Explanation, and Realism*. D. Charles and K. Lennon. Oxford, Oxford University Press.

Byrne, A. and D. R. Hilbert (1997). Colors and Reflectances. *Readings on Color: Volume 1 The Philosophy of Color*. A. Byrne and D. R. Hilbert. Cambridge, Mass., M.I.T. Press: 263–88.

Campbell, J. (1993). A Simple View of Colour. *Reality, Representation and Projection*. J. Haldane and C. Wright. Oxford, Oxford University Press.

Chalmers, D. (1996). *The Conscious Mind: In Search of a Fundamental Theory*. New York, Oxford University Press.

Clark, A. (1999). "A Case where Access Implies Qualia." *Analysis* 60, 30–38.

Dennett, D. (1979). *Brainstorms*. Brighton, Harvester Press.

Gaizzinga, M. S., R. B. Ivry, et al. (1998). *Cognitive Neuroscience*. New York, Norton.

Gibson, J. J. (1964). "Introduction to Ivo Kohler 'The Formation and Transformation of the Perceptual World'." *Psychological Issues* 3(4): 5–13.

Grice, H. P. (1962). Some Remarks about the Senses. *Analytic Philosophy, First Series*. R. J. Butler. Oxford, Blackwell.

Hardin, C. L. (1997). Reinverting the Spectrum. *Readings on Color: Volume 1 The Philosophy of Color*. A. Byrne and D. R. Hilbert. Cambridge, Mass., M.I.T. Press: 289–301.
Harman, G. (1990). "The Intrinsic Quality of Experience." *Philosophical Perspectives* 4, 31–52.
Harman, G. (1997). "Explaining Objective Color in Terms of Subjective Reactions." *Philosophical Issues* 7.
Harris, C. (1980). Insight or Out of Sight? Two Examples of Perceptual Plasticity in the Human Adult. *Visual Coding and Adaptability*. C. Harris. Hillsdale, Lawrence Erlbaum: 95–149.
Hurley, S. (1998). *Consciousness in Action*. Cambridge, Mass., Harvard University Press.
Jackson, F. (1982). "Epiphenomenal Qualia." *Philosophical Quarterly* 32, 127–36.
Jackson, F. (1986). "What Mary Didn't Know." *Journal of Philosophy* 83, 291–5.
Jackson, F. (2000). Philosophizing about Color. *Color Perception*. S. Davis. New York, Oxford University Press: 152–62.
Jackson, F. and R. Pargetter (1987). "An Objectivist's Guide to Subjectivism about Colour." *Revue Internationale de Philosophie* 41, 127–41.
Johnston, M. (1992). "How to Speak of the Colors." *Philosophical Studies* 68, 221–63.
Kentridge, R. and C. Heywood (2002). Conference Presentation, Tucson Consciousness Conference 2002. University of Durham, Durham, U.K.
Kohler, I. (1961). "Experiments with Goggles." *Scientific American* 206(May): 62–72.
Kohler, I. (1964). "The Formation and Transformation of the Perceptual World." *Psychological Issues* 3(4, Monography 12): 1–173.
Lewis, D. (1995). "Should a Materialist Believe in Qualia?" *Australasian Journal of Philosophy* 73, 140–44.
McDowell, J. (1996). *Mind and World*. Cambridge, Mass., Harvard University Press.
Milner, A. D. and M. Goodale (1995). *The Visual Brain in Action*. Oxford, Oxford University Press.
Mollon, J. D. (1997). "Tho' She Kneel'd in That Place Where They Grew . . . ": The Uses and Origins of Primate Colour Vision. *Readings on Color: Volume 2 The Science of Color*. A. Byrne and D. R. Hilbert. Cambridge, Mass., M.I.T. Press.
Mollon, J. D. (2000). "Cherries Among Leaves": The Evolutionary Origins of Color Vision. *Color Perception*. S. Davis. New York, Oxford University Press: 10–30.
Myin, E. (2001). "Color and the Duplication Assumption." *Synthese* 129, 61–77.
Myin, E. and J. K. O'Regan (2002). "Perceptual Consciousness, Access to Modality and Skill Theories." *Journal of Consciousness Studies* 9, 27–45.
Noe, A. (2002). "On What We See." *Pacific Philosophical Quarterly* 83, 57–80.
O'Regan, J. K. and A. Noe (2002). *A Sensorimotor Account of Vision and Visual Consciousness*.
Pettit, P. (1993). "A Definition of Physicalism." *Analysis* 53, 213–23.
Pettit, P. (1994). "Microphysicalism without Contingent Micro-macro Laws." *Analysis* 54, 253–57.
Pettit, P. (1995). "Microphysicalism, Dottism, and Reduction." *Analysis* 55, 141–46.
Pettit, P. (1998). "Practical Belief and Philosophical Theory." *Australasian Journal of Philosophy* 76, 15–33.
Pettit, P. (2002). *Rules, Reasons, and Norms: Selected Essays*. Oxford, Oxford University Press.
Pettit, P. (2003). Motion Blindness and the Knowledge Argument. *The Knowledge Argument*. P. Ludlow, Y. Nagasawa and D. Stoljar. Cambridge, Mass., M.I.T. Press.
Pettit, P. (forthcoming). "Descriptivism, Rigidified and Anchored." *Philosophical Studies*.
Pettit, P. and D. Stoljar (2002). How to Solve Permutation Problems. *Philosophy Program, RSSS*, Australian National University. Canberra.
Rorty, R. (1980). *Philosophy & the Mirror of Nature*. Oxford, Basil Blackwell.
Sellars, W. (1997). *Empiricism and the Philosophy of Mind*. Cambridge, Mass., Harvard University Press.
Shoemaker, S. (1994). "Phenomenal Character." *Noûs* 28, 21–38.
Smart, J. J. C. (1995). "Looks Red' and Dangerous Talk." *Philosophy* 70, 545–554.

Smith, M. and D. Stoljar (1998). "Global Response-dependence and Noumenal Realism." *Monist* 81, 85–111.

Stalnaker, R. (forthcoming). "Conceptual Truth and Metaphysical Neceessity." *Philosophical Studies*.

Taylor, J. G. (1962). *The Behavioral Basis of Perception*. New Haven, Conn., Yale University Press.

Thompson, E. (1992). "Novel Colours." *Philosophical Studies* 68, 321–49.

Thompson, E. (1995). *Colour Vision: A Study in Cognitive Science and the Philosophy of Perception*. London, Routledge.

Tye, M. (1995). *Ten Problems of Consciousness: A Representational Theory of the Phenomenal Mind*. Cambridge, Mass., MIT Press.