

CHAPTER 2

WHY COLORS ARE NOT PHYSICAL PROPERTIES

The vulgar have undoubted right to give names to things which they are daily conversant about; and philosophers seem justly chargeable with an abuse of language, when they change the meaning of a common word, without giving warning.

Thomas Reid (1764/1983: 69)

Psychology connects what is experienced with something physical, but we connect what is experienced with what is experienced.

Ludwig Wittgenstein (1977: III-234)

The accounts under discussion in this chapter hold that colors are the intrinsic properties of objects that science has or will identify as those causally responsible for color experiences. I will refer to this position as 'Physicalism' (with a capital 'P'), and I will refer to the *intrinsic* properties of objects of interest to Physicalism as 'Physical properties' (with a capital 'P'). Many accounts perhaps deserve the 'physicalist' title other than those discussed in this chapter. (It is an honorific, isn't it?) Here, though, I focus only on accounts according to which colors are *intrinsic* physical properties of objects, i.e., Physical properties. The proponents of these accounts (e.g., David Armstrong (1968, 1978, 1987), Kripke (1972), J.J.C. Smart (1975, 1987), and Frank Jackson and Robert Pargetter (1987)) share certain intuitions and motivations that justify placing them together. Other physical accounts – e.g., those treating colors as relational properties of interest to science – are discussed elsewhere, especially in the next chapter and in Chapter 5.

Physicalism might identify colors either with *natural* properties, i.e., any property that is a natural kind (Smart, 1963; Armstrong, 1968 and 1978; Kripke, 1972; and Jackson and Pargetter, 1987), or with disjunctive properties having only such natural properties as constituents (Smart, 1975). For instance, Physicalism might hold that blueness is some intrinsic property of objects causally responsible for experiences of blue, or it might hold that many such properties are causally responsible for such experiences and claim that blueness is a disjunctive property made up of the diverse set of properties that typically cause those experiences. I call this latter position 'Disjunctive Physicalism'.

Though Physicalism takes different forms, three intuitions motivate and unify its camps: (1) colors are causally efficacious;¹ (2) only non-relational (i.e., intrinsic) properties can be causally efficacious;² and (3) every intrinsic property of an object is a physical property, i.e., a property of interest to science. On the face of it, each of these intuitions seems well founded. Surely if there are colors, they must be causally responsible for color experiences. To think otherwise is to lack ontological seriousness. And almost as surely, since we have every reason to think that science has or will uncover the causes for every color experience, every cause of our color experiences is one that has been or will be identified by science, for otherwise there would be a strange systematic over-determination of all color experiences. So if we want both to explain what colors are and to accommodate the intuition that colors are causally responsible for our color experiences, then it seems we must identify colors with the intrinsic properties of objects that science identifies as the causes of those experiences. Indeed, this is just Physicalism's promise: to explain what colors are while accommodating the intuition that colors *cause* our color experiences.

I argue, however, that Physicalism cannot keep its promise. Specifically, I show that Physicalism is in a double-bind. First, it cannot accommodate well-entrenched intuitions about our epistemic relationship to colors while answering the metaphysical question it promises to answer, viz., in virtue of what are all things of the same color the same color? Second, it cannot maintain its ontological seriousness – i.e., it cannot accommodate the causal

¹ Cf. Jackson and Pargetter (1987).

² Cf. Jackson and Pargetter (1987), Elizabeth Prior, et al (1982), and Jaegwon Kim (1993b, 1993c).

nature of colors – without either falling prey to the empirical evidence or running against linguistic practice. Even Pollyanna has a hard time being glad about all of this.

1. COLORS AS NATURAL KINDS

We can understand the claim that colors are natural kinds as expressing two theses: first, for any color, there is some non-disjunctive Physical property, P, which is common to all and only things of that color; and second, that color and P are identical.

1.1 *Some Empirical Obstacles*

We might be tempted to identify blueness with some microphysical structure of objects that typically causes blue experiences in normal light. But as Kurt Nassau (1983) reports, there at least 15 features (at the structural level of objects) that are at times, even under normal conditions and for normal perceivers, causally responsible for some particular type of color experience (e.g., an experience of blue): incandescence (29-40), gas excitations (42-63), vibrations and rotations (65-74), transition metal compounds (77-104), transition metal impurities (77-104), organic compounds (109-138), charge transfer (140-151), metals (155-83, especially 155-68), pure semiconductors (155-83, especially 169-71), doped or activated semiconductors (155-83, especially 172-82), color centers (184-202), dispersive refraction (207-230), scattering (232-48), interference (250-80, especially 250-67), and diffraction (250-80, especially 268-80).³ For example, the blueness of the South American butterfly *Morpho rhetenor* results from interference (324-5), whereas the blueness found on the wings of the butterfly *Papilio polamedes* is the result of scattering (326). Gemstones appearing almost the same shade of blue may look blue due to very different structural features. For instance, the blueness of sapphire results from the transference of ions (140-3); the blueness of lapis lazuli results from vibrational energy (149); the blueness of Maxixe-type beryl results from a radiation-induced color center (200); and the blueness of blue

³ Elsewhere, Nassau (1997) groups the features responsible for color experiences into 14 categories rather than 15.

spinel results from a ligand field color in a cobalt impurity (91). Moreover, some objects are structurally very similar, although different in colors. For example, charge-transfer mechanisms similar to those responsible for the color of sapphire result in black or brown appearances in other minerals, as in *andalusite* (144). Thus, at the microphysical level, no non-disjunctive property is causally responsible for all of our typical blue experiences.

A second and more popular option is that taken by David Armstrong (1978): "if we ask what in fact the colours are, the physicalist reductions of these properties to light-emissions of different wave-length promises to reproduce the required logical characteristics" (126-7). Armstrong does not carry out the reduction, nor can he. Perhaps the most serious difficulty is posed by a phenomenon known as 'metamerism'. Metameric color stimuli are stimuli that have different radiant power distributions but match in color for a given observer (Wyszecki and Stiles, 1982: 184). We can say, then, that two objects are metameric matches for an observer under some lighting condition if, despite reflecting different wavelengths, they appear to have the same color under that lighting condition to that observer.⁴ As Hardin (1988) reports, regardless what we count as normal lighting conditions, there will be objects which look exactly the same under those conditions (perhaps to all normal human observers), but which do not reflect the same wavelengths of light. In fact, infinitely many combinations of wavelengths may result in the same color appearance. Thus, Armstrong's view has the unhappy consequence that objects that look the same color under normal conditions will often be different colors.

It seems, then, that the reduction of colors to intrinsic Physical properties must involve, at the physical level, a very large (perhaps open-ended) and heterogeneous disjunctive set of properties. The objects we describe as being blue have no non-disjunctive Physical property in common. The Physicalist might resist by pointing out that, for all we know, there might be a Physical level of description at which colors will find a home. But 'might' is a rather large hedge to hide behind and, in any case, Physicalists now generally

⁴ Normal human observers have three types of broad band sensors. Any objects that reflect the same percentage of light in each of these three wave bands under the same conditions will appear the same color under that condition. But objects that reflect the same percentage of light in each of these three wave bands may not reflect the same percentage of light at every wave band, and so they may not reflect the same percentage of light in each of these three wave bands under every lighting condition.

concede that no non-disjunctive Physical property covaries with any particular type of color experience, at least given the way we ordinarily type-identify our experiences. For this reason, the position that colors are non-disjunctive Physical properties has all but lost its following. But, just in case you remain hopeful, there is a second, *a priori* argument to consider.

1.2 *The Argument from Hyper-Skepticism*

Treating colors as natural kinds allows for what I will call 'hyper-skepticism'⁵ about colors; e.g., treating colors as natural kinds allows for the possibility that something might not be blue although it looks blue to all normal observers under all normal conditions. Hyper-skepticism about colors, then, is the view that normal observers under normal conditions might be mistaken about the color of an object. Although common sense supports a distinction between the appearance and reality of colors, it does not support hyper-skepticism. Indeed, it is widely held that normal observers under normal conditions are incorrigible about the colors of objects. Now I am not suggesting that banning hyper-skepticism is absolutely required (though Pollyanna insists on it). Few intuitions wield that kind of force. Instead, banning hyper-skepticism is a *prima facie* duty for any metaphysician concerned with colors (i.e., any account of colors allowing for hyper-skepticism fails, *prima facie*, to be epistemically serious). Although the best account of colors might entail hyper-skepticism, we should, at least at the start, hope for better. Since versions of Disjunctive Physicalism also (at least implicitly) endorse hyper-skepticism, it is worthwhile to look at this objection in greater detail.

First, to understand the claim that colors are identical to certain physical properties, we need an account of how some property of everyday concern might be identical to some underlying physical property. One common approach relies on Kripke's (1972) and Putnam's (1975) work on natural kinds, each of which I discussed briefly in the last chapter. Indeed, Kripke explicitly claims that colors *are* natural kinds. Kripke's story begins with an account of what he calls "rigid designators." Let 'E' be some expression that designates a property; then 'E' is rigid if and only if it designates the same property in every

⁵ I borrow the term 'hyper-skepticism' from Colin McGinn (1989: 54ff), though I use it differently.



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