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Philosophy of Color

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Most things we see look colored to us. But what is color? Where, if anywhere, is it? Why do we see it? When do we see it correctly? And how should we go about answering these surprisingly difficult questions?

This essay surveys philosophical work on color and color perception.

1. Color Metaphysics

Metaphysics is the study of what exists and how some things cause or explain other things.[1] Three important metaphysical questions concerning color are: is color *real*, *what* is it, and *where* is it?

Is color *real?* Usually the reality of color is seen as hinging on it being a property of external objects and scenes. We assume that if color is real, then things like blueberries, cornflowers, and Smurf dolls are *really* blue. Some philosophers argue that color is an illusion created by our brains,[2] but many others accept that blueberries and other objects do have real colors.

What is color? According to the simplest answer, *color primitivism*, color is a primitive, unique sort of property that cannot be identified with any other property that objects have.

Primitivism, though intuitive, is often considered scientifically unacceptable. Primitive colors are not the kind of properties that scientists normally include in their description of the world.

To accommodate color within the scientific worldview, some philosophers seek to identify it with some stable physical property of the environment, such as the disposition of object surfaces to reflect light in specific ways.[3] For example, the skin of a ripe blueberry reflects light in a way that normally looks blue to us.[4]

The main challenge for these *reductive physicalist* views is the existence of widespread variation in color perception. Imagine, for example, that you're viewing a blueberry in bright sunlight. The blueberry looks blue to you. Now imagine that dark clouds appear. The blueberry will continue to look blue but probably not the exact same shade of blue. This is perceptual variation due to changes in viewing conditions.

Additional perceptual variation stems from the differences in perceivers' visual systems. The blueberry that looks a specific shade of blue to you will look a different hue to another perceiver whose photoreceptors respond to light in different ways or whose brain processes those responses differently from yours.[5]

Because perceptual variation is so common, there is no neat-and-tidy correlation between color experiences and any stable physical properties of objects, which suggests that color might not be physical after all.

In fact, perceptual variation has led many philosophers to argue that color is a *relation* of objects to perceivers, such as the power of object surfaces to cause specific kinds of color experiences in perceivers. The idea is that colors depend on the perceiver as "secondary qualities" and are fundamentally different from qualities that don't depend on the perceiver, the so-called "primary qualities," such as shapes.[6]

One criticism of *relationalism* is that its analysis of color seems circular. If we define 'blue' as the power to cause blue experiences, the word 'blue' appears also in the definition—we still don't know what blue is.

Finally, *where* is color? Is it out in the world, in our minds, or somewhere in between?[7]

Though it is often assumed that color is either in the external world or in our minds, this assumption has been challenged. For example, according to some *color adverbialists*, colors are ways of perceiving the objects in the world, and neither entirely internal nor entirely external to us.[8]

One worry with adverbialism is that it is counterintuitive and inconsistent with how we normally speak of colors. We normally say that

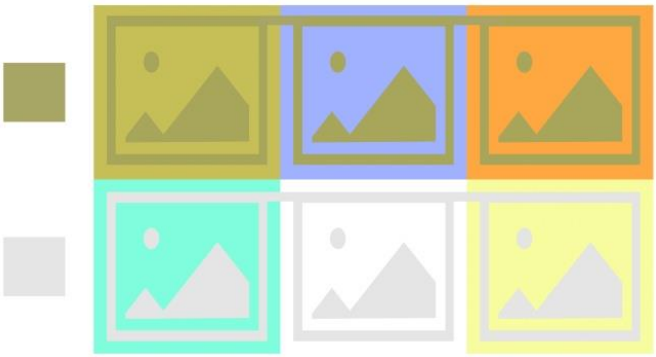
blueberries are blue, not that we're perceiving them blue-*ly*.

2. The Goal of Color Vision and the Correctness of Color Experiences

In addition to the three metaphysical questions, philosophers also theorize about the "goal(s)" of color vision. They ask why we experience color in the first place—what color vision is *for*.

Some think that the goal of color vision is to enable the perception of stable colors; others argue that the goal is to help animals see better in general.[9]

A related question has to do with the correctness of color experiences. Consider the image below illustrating the effect of background color on the perceived color of the photograph icon. The color of the icon appears to change when it's placed over different backgrounds.



An illustration of the simultaneous color contrast effect. The color of the photograph icon in each row appears to change when placed over different backgrounds.

If you believe that color experiences are correct when they match the "true" colors of things, you might think that there is only *one* way to correctly perceive the icon's color. Many color primitivists and reductive physicalists agree.[10]

But if you think that color experiences are correct when they make perception easier in general, you need not view the shift—which makes the icon "pop out" by increasing the contrast with its background—as illusory. Some color relationalists and adverbialists take this stand.

3. Methodology

When theorizing about color, philosophers employ different methods. Some consult their intuitions, which they view as reliable guides to truths about color.

You might have intuitions that each object has just one true, perceiver-independent color. For example, you might intuitively think that an object cannot be simultaneously yellow all over and pink all over.[11]

Then again, your intuitions might be more inclusive. Imagine an alien race that sees red when we see green and squares when we see circles. If you intuitively attribute error to the aliens' square perceptions but not to their red perceptions in this (somewhat bizarre) thought experiment, these intuitions might provide evidence for the perceiver-dependence of color.[12]

Other philosophers emphasize empirical research. For example, it is common to cite experimental data from psychology when answering the question about the goal(s) of color vision.[13] Evidence from neuroscience, visual ecology, and computer vision is also considered relevant.[14]

4. Conclusion

Philosophers generally agree that a satisfactory theory of color is both empirically informed and intuitively plausible. But this is where the agreement ends. When it comes to the metaphysical questions concerning color, the goal of color vision, and the correctness of color experiences, views diverge, often dramatically.

Notes

[1] For an introduction to this and other areas of philosophy, see Tom Metcalf's What is Philosophy?

[2] For example, C.L. Hardin (1988) is a *color eliminativist* who argues that color is merely a useful illusion. On Hardin's view, your perception of a blueberry as blue is just as illusory as the flashes of colorful lights you might experience if you close your eyes and press your fingers on them. Other philosophers (e.g., Boghossian & Velleman, 1989) and many scientists (e.g., Palmer, 1999) also think that the external world is devoid of color.

[3] For a defense of reductive physicalism, see Byrne & Hilbert, 2003.

[4] Many things that look blue to us reflect relatively more shorter wavelengths of light than they do medium and long wavelengths. Ripe blueberries, however, often reflect more of the longer wavelengths.

[5] Different species of animals have different color visual systems and different color perceptions. Normal human color perceivers have three types of cone photoreceptors. Dogs and cats tend to have two types of cones, much like human perceivers with

common color vision deficiencies, such as red-green color blindness. On the other hand, some birds have four (or more) types of cones, one of which is sensitive to ultraviolet light. This suggests that these birds see a broader spectrum of colors than humans do and make more subtle color discriminations (see Gerl & Morris, 2008).

It is a well-known fact that people with color vision deficiencies experience the world differently from normal human color perceivers. A less known fact is that there is substantial perceptual variation even among the "normal" perceivers. This variation has been demonstrated by studies in which subjects are asked to pick the color chip that they perceive as being a "unique" hue, e.g., a green that is *just* green with no mixing of blue or yellow (see, e.g., Kuehni, 2001). The fact that the participants in these studies often pick different chips suggests that they experience the colors of the chips differently. These behavioral differences are mirrored in differences in the underlying biology and physiology (see, e.g., Verrelli & Tishkoff, 2004).

[6] The distinction between primary and secondary qualities goes all the way back to the 17th century. For a useful overview, see Bolton, 2022.

[7] If color is out in the world, then it could be in objects (and perhaps in volumes and light sources) or in the light entering our eyes. That said, because our color experiences correlate *better* with the stable properties of *things* in the world than they do with the properties of the incoming light (e.g., Shevell & Kingdom, 2008), very few philosophers defend the view that color is a property of light.

[8] M. Chirimuuta (2015) offers a sophisticated, empirically informed defense of adverbialism.

[9] Of course, color visual systems don't have goals in the sense that people have goals. But they likely have goals in the sense of having specific functions or tasks that they are meant to perform. David Hilbert (1992) argues that the function of color vision is to represent the stable reflectance properties of surfaces. Kathleen Akins & Martin Hahn (2014) defend the idea that the function of color vision is to help us see better in general. They point out that having a color visual system allows us to perceive form, motion, depth and texture faster and more accurately than we would if we only saw the world in black and white.

[10] That said, there are different versions of both primitivism and reductive physicalism and some of these versions are consistent with the possibility of there being many different *correct* color experiences of the same surface (see, e.g., McLaughlin, 2003; Gert, 2017).

[11] See, e.g., Tye 2006.

[12] See Levin, 2000.

[13] For example, Hardin (1988), Hatfield (1992), Thompson (1995), Cohen (2009) and Chirimuuta (2015) emphasize research on perceptual variation. Hilbert (1992), Tye (1995), Byrne & Hilbert (2003), and Allen (2016) emphasize research on color constancy, i.e., the perceived stability of the colors of objects across lighting conditions.

[14] Akins & Hanh (2014) and Chirimuuta (2015) focus on what we currently know about color visual processing in the brain. Hatfield (1992) and Thompson (1995) emphasize the kinds of animal-environment interactions that color vision enables.

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