

Hitting the nail on the head

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This target article is a valuable antidote to several different ill-examined preconceptions, but I don't think it has quite succeeded in unmasking and neutralizing the bogey that motivates them all. This commentary attempts to do this by reinforcing, with minor caveats, some of the authors' main points.

In defense of their "enactive" account, Thompson et al. occasionally protest too much. For example, the trouble with (external) objectivism is *not* that it makes the mistake of holding the external environment constant, setting a problem for the organism. Following Levins and Lewontin (1983; 1985), Thompson et al. insist on the role of the organism in creating its visual environment, but this is a process that occurs almost entirely on an evolutionary time scale. It is true, as Lewontin has often pointed out, that the chemical composition of the atmosphere, for instance, is as much a product of the activity of living organisms as a precondition of their life, but it is also true that it can be safely treated as a constant, because its changes in response to local organismic activity are usually insignificant as variables in interaction with the variables under scrutiny. The same is true of the colors of objects: They have indeed coevolved with the color-vision systems of the organisms, but, except on an evolutionary time scale, they are in the main imperturbable by organisms' perceptual activity.

The fact of their coevolution is as important as the authors insist, however, when it comes to answering the *why* questions of color vision (and we do want scientific answers to *why* questions). One of the flaws in (external) objectivism is that it discourages the exploration of a large class of empirically promising hypotheses. For example, why does a certain fruit turn a particular shade of red when it ripens? It *might* be that the availability of a certain photopigment for exploitation in the eyes of the target fructivores had a larger role to play in the answer than, say, the constraints on byproducts of sugar formation in

the fruit. The work cited on coevolution of organism coloration and color vision strongly suggests that color-coding (to reduce the cognitive load on the target perceiver) is at the basis of at least much if not all color vision (Dennett 1991). Things are the colors they are *because* we (or other creatures) have the sorts of color-vision systems we have, and we have the systems we have because they enable us to see the colors things are.

But still the traditional appeal of the idea that colors must be objective, independently existing properties of surfaces asserts itself. Consider the chameleon. We accept that the chameleon actually changes color (as opposed to merely seeming to change color) because we understand that it has a way of changing the relevant microphysical structure of its surface, the structure that determined “surface spectral reflectance.” In contrast, we would be more disinclined to say that some other organism changed color (as opposed to merely seeming to change color) if it accomplished this by merely moving into different illumination without changing its surface microstructure. But this might be just as valuable a countermeasure, and hence should be viewed as just as sturdy a candidate to anchor the biological category of color.

Consider the well-known mimicry by nonpoisonous species of brightly colored poisonous species in the vicinity. I do not know if there are any actual cases, but it could be that a mimic species had discovered a microphysically different “way of being bright red” – at least in the normal illumination environments of the relevant predators. Would we say that these mimics were *the same color* as the poisonous species? They might not be seen to be the same color by us, or even by their predators under abnormal conditions, and yet such a case should count as different ways of being the same color. The two species would “match,” for instance, in the same way the color of the drapes matches the color of the woodwork – the way that matters (to us) – even if they don’t match under all conditions.

But what, then, *are* colors? Doesn’t this imply that only a circular definition of color is possible? Yes, but as the authors say, “one should not be put off by the circularity” (sect. 3, para. 16). The real bogey is the fear that if we cannot give a foundational, objective definition – either in the form of an external objective definition (e.g., Hilbert 1987) or in the form of an equally objective internal or neurophysiological definition – we will be stuck with “intrinsic, ineffable, unknowable” qualia. The true value of the enactive view is that it explains why neither of these sorts of objective account is necessary to avoid the extreme subjectivism of Nagel (1974). Both these varieties of reduction are embarrassed by the specter of having to deal with all the counterexamples by brute force enumeration of exceptions – a telltale sign, presumably, that they have failed to capture the “essence” of color. An enactive account, however, can explain, objectively and scientifically, everything that needs explaining – including the fact that no compact, noncircular definition of color is possible – with no leftovers conceded to mystery.