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John Sutton, review of Don Dedrick, *Naming the Rainbow: colour language, colour science, and culture*.

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Don Dedrick, *Naming the Rainbow: colour language, colour science, and culture*.

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If the so-called 'science wars' are futile shouting-matches between extremists, some of the more bewildering skirmishes have been contested in the realm of colour science and culture. Ethnographers, postmodernists, and Wittgensteinians stress the specificity of local colour naming strategies, or the peculiarity of objects and emotions with which colours are associated, and may confess lingering attraction to Whorf's idea that cultures carve up an intrinsically unstructured colour space into quite arbitrary linguistic categories. Self-proclaimedly hard-headed biological and evolutionary psychologists, in contrast, argue that the pan-human physiology of colour perception determines our colour categorization, and constrains whatever minimal linguistic variability there is. Don Dedrick's wonderful study in the philosophy of cognitive science offers not only a careful survey of the relevant evidence in this stand-off, but also a persuasive set of tools for thinking the issues through quite differently, and for avoiding the dichotomous terms in which the debates have previously been couched. The book should be essential reading for colour scientists, and for philosophers interested in links between cognition and culture; and it offers useful advanced introductions to detailed technical literatures in psychophysics, colour linguistics, and cognitive anthropology.

Dedrick argues for a genuinely cognitive view of colour categorization. Both the universalists and the cultural relativists, he complains, deny any interesting autonomous role to cognition, seeing it as 'merely a conduit for biology, or for culture', so that what goes on in the mind is entirely determined by either subpersonal or social goings-on. Dedrick builds his own positive account of 'a general cognitive strategy for the construction of relatively stable reference classes in the chromatic domain' on top of an impressively detailed exposition and critique of 'the universalist tradition in colour naming research'. The first half of the book describes the historical, experimental, and conceptual development of this tradition since Berlin and Kay's landmark *Basic Color Terms* (1969). Dedrick offers us a primer on the relevant consensus in psychophysics (the opponent colours theory) and in the pre-cortical neurophysiology of colour vision. In each case, his selective treatment is motivated by the clear aim of seeking as sympathetic as possible an account of how an idealized version of the bold universalist hypotheses is meant to hang together.

Berlin and Kay argued, against the assumption of limitless cultural variability in colour categorization, that in fact different languages use a very limited number of 'basic colour terms', originally taken to be a maximum of 11. Although different speakers of a language draw the boundaries of each colour category differently, they tend to agree on the 'best example' or 'focal point' of the category named by each basic term. Dedrick stresses the crucial importance of the next step in the retreat from relativism. Focal colours are still linguistically embedded, in that they are chosen relative to the basic terms of a language: a substantive universalism requires evidence for the non-linguistic salience of certain colours. This was provided by Eleanor Rosch's work with the Dani, who have just two basic colour terms. Rosch showed that certain colour categories, those which happened to have a 'focal' colour in a central location, could be more easily remembered than others, even without the existence of a word for those categories. The salience of such colour 'prototypes' thus transcends language. These results set the agenda for the universalist tradition in trying to map a remarkable set of regularities, both linguistic and psychological, onto the regularities being sought in psychophysics and physiology.

Dedrick brings a sophisticated, if largely implicit, philosophy of science to his narrative of colour science. He urges us to see the 30 years of universalist work since 1969 as a practical and dauntingly difficult research program, with internal divisions, crises, and anomalies large and small, rather than as monolithic imperialism. Though he isn't engaged in sociology of science, Dedrick's pragmatic take on theory-development does suggest how important would be a careful treatment of the intellectual and social context of those involved in the setting up and development of the impending 'world color survey'. It would also be useful to hear more on Dedrick's picture of the relation of colour science to cognitive science as a whole. In an excellent recent textbook, Stephen Palmer suggests that 'certain aspects of color perception are among the best-understood topics in vision science, perhaps in all of cognitive science', and takes colour to exemplify the power of the uniquely interdisciplinary method of cognitive science, because 'important pieces of the color puzzle have come from physics, psychology, physiology, computer science, linguistics, genetics, and anthropology'. Is colour in some way a more tractable domain than others in cognitive science, such as memory, emotion, or dreaming? Is it that at least the internal processes of colour vision are more invariant across individuals than those involved in other cognitive capacities? Is it that the data gathered by the marvellous tradition of anthropological enquiry into colour naming, back to W.H.R. Rivers and beyond, make it easier to formulate hypotheses about culture and cognition? Philosophers of cognitive science such as Barbara von Eckardt, Valerie Hardcastle, and Patricia Kitcher have begun to construct a general framework for understanding the developing or immature state of the interdisciplinary enterprise, and Dedrick's expert understanding of the history of colour science would equip him well to contribute to that project.

Dedrick makes it clear that the most optimistic reductive dreams of the universalists cannot be satisfied. Of most philosophical interest is his succinct critique of over-hasty level-jumping. The Berlin/Kay tradition hoped to derive the semantic structures of colour categories direct from the neural response functions of cells in the lateral geniculate nucleus: but Dedrick argues both that there are many failures of fit even between psychophysics and the 'gigantic tangle' of colour neurophysiology, and that there is no need to think of a simple and single hierarchy of levels, since many of the most interesting colour phenomena straddle disciplines and domains. He gives short shrift to the Berlin/Kay notion that there's a fixed developmental ordering of colour category stages, with more technologically complex cultures exhibiting a more advanced, fuller set of basic terms. Dedrick productively replaces teleological talk of the 'evolutionary' sequence of colour categories with inquiry instead into how weak or strong are the epigenetic constraints on the cultural expression of psychological regularities in colour naming practices.

The book's specific positive contribution is to offer a new, detailed, and persuasive account (in terms of relative similarities or isomorphisms) of the problem of 'composite' colour categories, for which no satisfactory universalist explanation has been offered. Here Dedrick draws inspired guidance from Bernard Harrison's neglected 1973 philosophical classic *Form and Content* (if your library, like mine, is trying to 'cull' all titles which haven't been borrowed for 10 years, you might want to think about going in search of this book right now). He argues that colour categories are constructed, rather than natural, nameables: non-linguistic perceptual saliences interact with social practices in the difficult social process of abstracting out from colour samples to construct colour categories. This picture explains why there is less arbitrariness in colour categorization than the relativists thought, but also why there is more arbitrariness than was allowed in any universalist quest for exceptionless cross-cultural generalizations. There is a space between the genuine perceptual constraints on colour vision and the cultural exigencies which drive specific naming strategies. So the danger of any reduction of ethnography to neurophysiology is chimerical; while the alternative view that culture does just about everything is itself too reductive (Dedrick is harsh on particular relativist critics of universalism who fail to understand the restricted scope of universalist claims). It is interesting sociologically that not all those who have reached the requisite level of expert immersion in the multiple relevant fields and methods have automatically thus achieved a more balanced perspective on the big theoretical issues here: in fact, Dedrick's apparent preference for Popperian over Kuhnian philosophy of science might be questioned by pointing to the normalizing role of universalist assumptions in interpreting messy evidence.

It is definitely helpful thus to reject the idea that the culture-biology interface in colour science must be resolved in favour of one or the other. Dedrick is sympathetic to the methodological motivations

of anthropological critics, while maintaining resolutely that there's room both for 3rd-person and cross-cultural investigation, and for unique sociohistorical narratives of particular naming practices. He needs perhaps to give us some more specific examples of the kind of cultural exigencies which might usefully feature in cashing out the notion of epigenetic constraints if he wants us to buy his interdisciplinary dreams. The peaceful coexistence of neurophysiology and ethnography is far from their creative interaction. Many even more difficult questions remain: to take just one example, are there any intercultural patterns in the spread and nature of intracultural individual differences in colour categorization? By spotlighting the irreducible role of cognitive processes between biology and culture, this brilliant synthesis and critique of the universalist tradition offers a genuine starting-point, as Dedrick hopes, for all future 'serious inquiry into the relationship between linguistic and non-linguistic aspects of colour classification'.

John Sutton
Macquarie University, Sydney

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