Notes and Comment

Reply to Beck and Ivry

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Beck, Prazdny, and Ivry (1984) reported findings that challenged the adequacy of a model for the perception of transparency proposed by Metelli (1970, 1974). Metelli (1985) and Metelli, Da Pos, and Cavedon (1985) replied to Beck et al. (1984). Beck and Ivry (1988) reported further findings that challenged again the adequacy of the Metelli model.

Metelli recently passed away. I shall not defend his model in general, because I hold a different point of view on phenomenal transparency (Masin, 1984a, 1984b; Masin & Gardonio, 1985). Here I comment only on a phenomenon mentioned as Point 3 in the last sentence of the abstract of Beck and Ivry's (1988) paper: "(3) the occurrence of transparency with and without color constancy (i.e., the color seen through the transparent surface looks or fails to look the same as the color seen directly)."

Beck and Ivry (1988) give the reader the clear impression, particularly in Table 1, that failure of "color constancy" in transparency is a serious problem for the Metelli model. The idea is also conveyed that failure of "color constancy" is a phenomenon first noted by them: "Beck et al. (1984) suggested that the perception of transparency with a stationary pattern can also occur without color constancy" (Beck & Ivry, 1988, p. 588). However, failure of "color constancy" in transparency was already known. In fact, Metelli minted the term "anomalous transparency" for this phenomenon in both two- and three-dimensional patterns (Masin, 1978; Metelli, Masin, & Manganelli, 1980, Appendix 3).

Let us refer to Figure 1 in Beck and Ivry's paper, where two regions with reflectances d and c (corresponding to a transparent surface) on a two-part background with reflectances a and b are depicted. When there is "color constancy," the degree of transparency, α , and the color, τ , of the transparent surface in the Metelli model are given by the following equations (Metelli, 1970):

$$\alpha = (d-c)/(a-b) \quad (1)$$

and

$$\tau = (ac-bd)/(a+c-b-d). \quad (2)$$

When "color constancy" fails (i.e., when there is anomalous transparency), the following equations hold (Masin, 1978, p. 179):

$$\alpha = (d-c)/[\nu(a-d) - \nu^*(b-c) + (d-c)] \quad (3)$$

and

$$\tau = [\nu(a-d)c - \nu^*(b-c)d]/[\nu(a-d) - \nu^*(b-c)], \quad (4)$$

where ν and ν^* are coefficients that vary in the interval $[0,1]$ and represent the degree of "color constancy" on the two parts of the background. Equations 3 and 4 reduce to Equations 1 and 2, respectively, when there is perfect "color constancy" ($\nu = \nu^* = 1$).

The Metelli model accounts for the failure of "color constancy" in transparency (anomalous transparency) through Equations 3 and 4. Beck et al. (1984) and Beck and Ivry (1988) ignored Equations 3 and 4.

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