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LETTER TO THE EDITORS

LOOKING AT THE WORLD THROUGH A ROSE-COLORED GANZFELD

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The recent exchanges between Walraven and Shevell (Walraven, 1976, 1979; Shevell, 1978) led me to wonder how visual stimuli would appear if viewed against a colored ganzfeld. First, to review the dispute: Walraven claims that a chromatic background is "discounted" when a test stimulus is superimposed upon it and that the background's only effect is to produce a gain change—i.e. a von Kries transformation. Shevell claims that Walraven's results only hold in special conditions and that the general condition requires two processes: the multiplicative process described above, as well as an additive process whereby a signal from the background is summed with that of the test (cf. Jameson and Hurvich, 1972). Both researchers agree that spatial and temporal transients are important determinants in the interaction between background and test; in Walraven's recent (1979) reply to Shevell he notes that the pure multiplicative model should work best when the test has spatial and temporal transients that are characteristic of natural viewing conditions, while the background lacks these transients.

Suppose, then, that one produced a background with almost no spatial or temporal transients—a background that had no edges and remained steadily present. Further, suppose that one viewed a natural scene through this constant veil, so that spatio-temporal transients were naturally a part of the "test" pattern. Surely this condition would be most favorable to Walraven's position; if there were any condition under which the background should be "discounted", this would be it. The only problem is instrumentation: how can one produce this edgeless field, and still allow the eye to view a natural scene?

If one presses the bulb of a penlight firmly against the lower lid of the eye, while keeping the eye open, the light from the bulb, having passed through the blood vessels of the lid and the choroid, fills the eye with a diffuse reddish glow. At first, the added redness is visible everywhere, but after about one minute the eye adapts to the field and one can carefully observe the shifted color appearance of objects in the room. I did this in a room that was illuminated by ordinary daylight fluorescent lamps.

The hues of white objects were shifted toward bluegreen and this was true for bright objects, such as the fluorescent lamps, as well as for the white surfaces illuminated by these lamps (e.g. sheets of paper). On the other hand, black or dark grey objects and shadows, took on a dark reddish cast (sometimes yellowish-red) as if filled with a reddish haze. The same variation in hue with intensity was also noticeable for surfaces of various colors other than white. For some reason, the effect was particularly striking when one viewed a blue object; when dimly lit, the object took on a lovely shade of reddish-blue; when more brightly lit it appeared greenish-blue. Several observers have verified these effects.

If a pure multiplication were occurring, as in Walraven's model, scaling of intensity should not cause the hue to change as observed. A white object and a dark grey object should both appear bluish-green and a blue object should not change from reddish-blue to greenish-blue and its intensity is increased. The observed effects are in contradiction with a one-process multiplicative model, but are in perfect accord with the predictions of a two-process model such as that of Jameson and Hurvich, or Shevell.

Consider what the two-process model predicts about the appearance of a white patch on a red background. The background has two effects. First, it causes the gain of the long-wave cones to drop with respect to the gain of the middle and short-wave cones: thus the white patch should look less reddish and more bluish-green. Second, the background adds its own redness into the patch's color appearance. which should cause the patch to look more reddish. The two effects are more or less in opposite directions. When the white patch is dim, the additive effect will dominate, but when the patch is bright, the multiplicative effect will dominate (see Shevell, 1978). Thus, the hue should change from reddish to bluish-green as the patch increases in intensity—exactly as is observed.

The same effects continue to be observed when strong temporal transients are introduced into the test stimulus. By alternately covering and uncovering the eye with a black card, one can cause the test stimulus to undergo large and rapid changes, while the edgeless red background remains steadily present. As before, bright objects are shifted toward blue-green, but dim ones retain a reddish cast, in accord with the predictions of the two-process model.

The experiments described here are simple but the implications are clear: even when the background lacks significant spatial and temporal transients and the test contains them—conditions that should favor pure multiplicative effects—walraven's model cannot accommodate the observations. On the other hand, a two-process model, incorporating both additive and multiplicative effects makes predictions that agree with the observations.

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