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Spatial averaging of afterimages between contours

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Abstract

After fixation on a colored surface, negative afterimages can be seen on a white test surface. Using multi-color stimuli, and both subjective reports and quantitative matching methods, we found chromatic afterimages that averaged spatially between areas marked out by black contours in the white test field (van Lier & Vergeer, ECVP 2007). Thus, one and the same stimulus could elicit different afterimages at the same retinal location depending on the position of achromatic test contours presented after the colored stimulus. Depending on the specific color settings, these different afterimages may even be complementary in color space. In one experiment, we adapted to a plaid consisting of two transparently superimposed square-wave gratings, one grating of horizontal blue and yellow stripes, the other of vertical red and green stripes. Following adaptation, we examined the afterimage seen on a white test field. Results: thin black horizontal lines in the white test field yielded an afterimage consisting of yellow and blue horizontal stripes, whereas thin black vertical lines yielded an afterimage consisting of red and green vertical stripes. Several experiments show accumulating evidence both for averaging of afterimage colors between contours and for lateral inhibition (color induction) across contours. Instead of black lines, test fields contours could equally well be defined by second-order, equiluminous textures - the same color changes in the afterimages were observed. Our results are in line with both diffusive and non-diffusive models of perceptual filling-in for real colors, since in both types of models the process of perceptual filling-in can be blocked by boundaries. We argue that for the brain, afterimages are similar to real colors. For that reason, mechanisms driving filling-in of real colors should also be expected to be involved in the processing of afterimages.

Vergeer, M. Anstis, S. van Lier, R. (2008). Spatial averaging of afterimages between contours [Abstract]. *Journal of Vision*, 8(6):589, 589a, http://journalofvision.org/8/6/589/, doi:10.1167/8.6.589. [CrossRef]