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Equilibrium temporal dynamics of neon color spreading

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Abstract

The neon color illusion reveals fundamental properties of the human visual system (Van Tuijl, 1975; Varin, 1971), as perceptual filling-in of color is thought to underlie surface completion and object recognition. Although spatial factors of neon color spreading have been extensively studied, limited research has characterized its temporal dynamics. We measured the temporal modulation transfer function (MTF) of neon color spreading. Two practiced observers with normal color vision and corrected acuity completed threshold measurements for detection of flicker for crosses (real color) and neon spreading (illusory color) in the same display. Five reference crosses and five test crosses were presented on an 8×8 black grid (2.24×2.24 deg), with the test crosses forming two chevrons pointing left and right. Each test cross was at an eccentricity of about 0.66 deg. The test crosses in the display sinusoidally flickered either between complementary red and blue (bipolar flicker), or between red and grey (unipolar flicker), and the color of the reference crosses was fixed at mid-chromaticity of the test colors. Sensitivity was measured for temporal frequencies from 0.5 Hz to 10 Hz or higher for both color conditions (unipolar and bipolar) and both tasks (judging real and illusory colors). All MTF curves for flickering crosses have higher sensitivities than the neon color MTFs at all frequencies, and nearly all MTFs have

a clearly bandpass shape. For each observer the MTF for the unipolar and bipolar conditions are different in shape, suggesting possible differences in dynamics of responses to the red and blue lobes of the bipolar flicker.