Perception of Temporally-Varying Color Depends on Both Monocular and Binocular Neural Mechanisms

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The perceived color of light in one region of visual space depends on light in surrounding regions. Perception of a central light that varies in chromaticity over time is strongly affected by a temporally-varying chromaticity in the surround. Both monocular and binocular neural processes are shown here to mediate the percept of the central temporally-varying light. METHODS: Observers viewed a central test stimulus (1 deg diameter) with the *l* chromaticity of Macleod-Boynton space varying over time. This stimulus had a surround (6 deg diameter) that also varied in *l* chromaticity at the same temporal frequency. Center and surround were separated by a thin dark gap (0.2 deg) and were either presented to the same eye (monocular condition) or to opposite eyes (dichoptic condition) at the same frequency (3.125, 6.25, or 9.375 Hz). Relative phase between center and surround was varied. Observers adjusted the modulation depth of a separate temporally-varying field to match the perceived modulation depth in the central test area. RESULTS&CONCLUSIONS: In both the monocular and dichoptic conditions, the perceived modulation depth of the central light depended on the relative phase of the surround; this could be modeled as a linear combination of center and surround modulation. At the lowest temporal frequency, 3.125 Hz, the surround's influence was virtually the same for monocular and dichoptic conditions, suggesting at this temporal frequency that the surround influence was mediated by only a binocular neural mechanism. At the two higher frequencies, the surround's influence was greater for the monocular condition than the dichoptic condition, and this difference increased with temporal frequency. These results are consistent with a linear combination of responses from two separate neural mechanisms that mediate the influence of the surround, one binocular and dominant at lower temporal frequencies (<4Hz) and one monocular and predominant at higher temporal frequencies (6-10Hz)

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