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Simultaneous Color Contrast as a Tool to Assess Anomalous Color Vision

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Anomalous color vision alters the perception of chromatic stimuli, yet conventional diagnostic tools often assess color discrimination in isolation, overlooking the influence of contextual processing. In this study, we investigated whether chromatic induction—perceived hue shifts of target colors surrounded by colored fields—can reveal both the type and severity of anomalous color vision. Participants with protanomaly or deuteranomaly completed hue-matching and categorical color-labeling tasks across eight stimulus angles. Leave-one-out cross-validation and linear regression analyses revealed systematic relationships between perceived hue and both the type and severity of the anomaly. These effects were consistent across hue-matching and categorical labeling tasks, indicating that chromatic induction modulates both continuous and categorical aspects of color perception. Collectively, the findings demonstrate that chromatic induction provides a sensitive and ecologically valid index of anomalous color vision, capable of capturing not only anomaly type but also its severity along a continuous dimension.

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