Do Color Naming Functions Predict Unique Hue Loci?

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Unique green and unique yellow loci were determined indirectly via color-naming functions and directly using a forced-choice, double-random staircase procedure for four observers. In both procedures, a 2.5° stimulus was used that filled perceptive fields for blue, green, yellow and red; all measurements were made at 10° temporal retinal eccentricity. Color-naming functions were obtained for monochromatic stimuli (480-620 nm, 20 nm) at 4 min intervals following a bleaching (5500K) stimulus. Unique hue loci obtained with the staircase procedure were measured 4-9 min post-bleach and after 28 min dark adaptation. The unique hue values at these two measurement points were compared to the 8 min and 28 min post-bleach values derived from the color-naming functions. These time points were selected to permit comparison of hue loci determined without rod contribution and with rod contribution. In general, the unique green loci measured with the staircase procedure were substantially shorter than those derived from color-naming functions, ranging from 3 to 19 nm with the time period associated with the cone plateau and 21 to 37 nm with the time period associated with the rod plateau. The unique green loci derived from the color-naming functions showed a shift from shorter to longer wavelengths with time post-bleach while there was a minimal shift between the two unique green loci measured in the staircase procedure. The differences in unique yellow loci between the two methods were much smaller than those for unique green, but showed a similar pattern. Thus, the hue loci derived from the color-naming functions were different from those obtained with the direct method, though the direction of shift was maintained from the bleach to the no-bleach conditions. These differences between methods may reflect the different criteria used to determine unique hue loci or perhaps, and more interesting, the different procedures reflect mediation at different points in the visual pathway.