

A computer-controlled colour vision test that combines the principles of Chibret and of Stilling

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Computer-controlled displays have been used successfully for testing congenital and acquired deficiencies of colour vision (e.g. Vingrys & King-Smith, 1986; Arden *et al.* 1988): typically the subject is required to detect a spot or a grating on a raster screen, and the chromaticity of the target is modulated along varying axes of colour space (as in the chromatophotometer of Chibret, 1887). But two factors may restrict such displays to the laboratory and prevent their use for general screening: (a) if minor misalignments of guns occur, the targets may reveal themselves by edge artifacts (Vingrys & King-Smith, 1986), and (b) if the experimenter is to be confident that only chromatic pathways are being probed, luminosity equations must be made for each individual patient. Closely analogous problems faced the designers of the first pseudoisochromatic plates. The stratagems adopted by Stilling (1883) were (a) to form the stimulus array from discrete patches each with its own contour, and (b) to vary randomly the reflectances of the patches.

The present test employs an array of discs of varying size and luminance. A subset of discs differ in chromaticity from the background and form a Landolt C. The subject is asked to press one of four buttons corresponding to possible orientations of the target. Excursions of chromaticity are made along protan, deutan and tritan confusion lines in colour space; and the magnitude of the excursion is adaptively adjusted according to the subject's performance. The test reliably separates protan and deutan types of congenital deficiency and gives a quantitative measure of severity.

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REFERENCES

- ARDEN, G. B., GÜNDÜZ, K. & PERRY, S. (1988). *Clin. vis. Sci.* 2, 303–320.
CHIBRET (1887). *Rev. Gén. d'Ophtalmol.*, p. 49.
STILLING, J. (1883). *Pseudo-isochromatische Tafeln für die Prüfung des Farbensinnes*. Kassel: Fischer.
VINGRYS, A. J. & KING-SMITH, P. E. (1986). *Color Res. & Application* 11 (Suppl.), 57.