

## **Identification of slight anomalous trichromatism with the Ishihara and American Optical Company (Hardy, Rand and Rittler) pseudoisochromatic plates**

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Pseudoisochromatic tests are widely used to identify abnormal red-green colour vision. Screening efficiency depends on design parameters and pass/fail criteria. The aim of this review is to document the number of errors made on the 16 Transformation and Vanishing screening designs of the 38 plate Ishihara test and on the America Optical Company (Hardy, Rand and Rittler) test by people with slight colour deficiency. All the HRR plates have Vanishing designs. Results obtained by 486 male anomalous trichromats, identified with the Nagel anomaloscope, were abstracted from files held in a Colour Vision Advisory Clinic. A total of 66 subjects (13.6%) made 8 errors or less on the Ishihara test. These included 61 of 416 deuteranomalous trichromats (15%), mean anomaloscope matching range 6.5 scale units, and 5 of 70 protanomalous trichromats (7%), mean anomaloscope matching range 5 scale units. Twenty five subjects (5.3%) made 5 errors or less. Eight deuteranomalous trichromats made fewer than 3 errors and may not have been identified as colour deficient. A total of 23 subjects (4.7%) made no error on the HRR screening plates and 12 subjects failed to see one figure which is allowed to people with normal colour vision. As a result 35 subjects (7%) would not have been identified as colour deficient (2 protanomalous and 33 deuteranomalous trichromats). Three errors is the recommended fail criterion for the AO HRR and the Richmond 2002 HRR because this gives 100% specificity. Fourteen percent of subjects, including 20% of deuteranomalous trichromats, would have passed using this criterion.

These data show that identifying abnormal colour vision is test specific and that fail criterion based on a specific number of errors can influence the estimated prevalence of red-green colour deficiency in population studies and compromise understanding of genotype / phenotype relationships.