Experimental study of the individual differences on chromatic perception through blue-yellow metameric matches of a white-light continuum

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Previous studies show how to manifest through psychophysical tests the individual differences on colour vision on observers, suggesting the possibility to link the chromatic space from the standard observer and the real perceptive space from any individual. A test to study the inter-observer variability through metameric colour matches was designed; using blue-yellow metameric matches of a white-light continuum on eight non-defective observers, we aimed to define the optimal wavelengths where each one of them achieved the match. The tests showed chromatic stimuli on a bipartite 2° field, surrounded by an achromatic 15° adaptation field with a constant luminance of 28 cd/m^2. On the right field a white-light continuum from an 8W florescent light was presented (matching on luminance the adaptation field), and on the left field there was a mixture from two monochromatic stimuli (484/576nm on a first series and 492/576nm on a second series). The luminance of these chromatic stimuli was adjusted by the researcher by a staircase method, where the observer provided feedback about the similarity on luminance and chromaticity between both fields. Since for a fixed yellow wavelength the match with the target white can be achieved by one (and only one) corresponding blue wavelength (which is particular for each observer), the blue wavelengths were a first approach based on the 2° CIE1931 standard observer. The real observers could modify its value through a gear handle. Once the observers reached an achromatic match, they were asked to modify the blue wavelength to achieve a perfect match on both fields. Generally, the observers had to modify the blue wavelength to achieve the metameric match. On both series each observer had a particular optimal blue wavelength, different from one another. The difference between the deviations from the standard observer from both series had a constant value amongst the observers.

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