▪ 266

Effect of coloured sunglasses on the colours of natural scenes

LINHARES JMM (1), NASCIMENTO SMC (1), FOSTER DH (2), AMANO K (2)
(1) Department of Physics, University of Minho, Braga
(2) Visual & Computational Neuroscience Group, University of Manchester Institute of Science and Technology, Manchester

Purpose To estimate the effect of coloured sunglasses on the chromatic diversity of natural scenes.

Methods Hyperspectral images of natural scenes were taken from 400-720 nm at 10 nm intervals (Nascimento et al, 2002 Journal of the Optical Society of America A 19 1484-1490) and calibrated to obtain the spectral radiance for each pixel of the scene. The transmittance spectra of 11 coloured lenses of commercial sunglasses were measured with a spectrophotometer and their effect on the light reaching the eye from the natural scenes computed. The coloured lenses were of acrylic type with blue, rose, grey, green and brown colours, and of glass type with green and brown colours. The number of discernible colours in each scene viewed with and without the coloured lenses was estimated by computing for each image the CIELAB representation of all pixels and counting the number of unit volumes in the three-dimensional volume defined by the scene in that space.

Results It was found that in general the effect of coloured sunglasses was to increase the estimated number of discernible colours and with some lenses, such as brown and green glass lenses, it was possible to obtain increases of around 15%.

Conclusion Contrary to expectations, coloured sunglasses need not impoverish the chromatic content of the scenes and in some cases they may actually improve it.

▪ 267

Computerised Chromatic Contrast Threshold Measurement Study of Digoxin Therapy

GAUBA V (1), ONG GL (1), SALEH G (2), DEWIT D (2)
(1) Vision research department, Sussex Eye Hospital, Brighton
(2) Ophthalmology Department, Colchester

Purpose To study the use of a computerised chromatic contrast threshold (CCT) measurement system to look at the following associations:1) Therapeutic digoxin levels and CCT2)Digitoxicity and CCT 3)Duration of digoxin use and CCT

Methods Study group: 56 patients receiving maintenance digoxin therapy with no other conditions known to affect colour vision.Control group: 62 age and sex-matched healthy subjects, with no history or signs of eye disease.Measurements: Venous blood sample for serum digoxin concentration taken at least 6 hours after the last digoxin dose. CCT was measured using a computerised cathode-ray-tube based system along the red-green (constant S-cone) and tritan (constant L/M-cone) confusion axes.

Results Of the study group, 54 had therapeutic digoxin levels and 2 were digitoxic. Laboratory therapeutic reference range for digoxin was 0.8 - 2.0 ng/ml.1)Mean red-green CCT (RGCT) and tritan CCT (TCT) for patients with therapeutic digoxin levels were 0.45 and 0.53 compared to 0.44 and 0.51 for the control group respectively. This difference was not statistically significant ($p>0.05$). However TCT was significantly correlated with serum digoxin levels ($r=0.56, p<0.0001$) more so than RGCT ($r=0.4, p<0.005$).2)RGCT and TCT for the digitoxic patients was significantly worse than therapeutic patients.3)Duration of digoxin therapy was not significantly correlated with CCT.

Conclusion CCT does not appear to be significantly affected in the therapeutic digoxin range, however TCT deteriorates significantly with increased plasma digoxin levels. CCT is significantly affected in digitoxic patients and may be useful as a screening tool requiring further study. The duration of digoxin therapy seems to have no significant bearing on CCT measurements.

▪ 268

Studies on the perception of very small visual stimuli (microdots)

NILSSON M, MARTIN L
Clinical Neuroscience, Stockholm

Purpose To quantify the effect of age, binocular summation, luminance and contrast on the perception of the microdot stimulus in normal subjects.

Methods The Rare Bit Microdot Foveatest (Frisén 2002), relies on the perception of very small (< 0.5 MAR) bright stimuli, called microdots.Three experiments were made.1. 25 subjects were tested with reduced screen luminance by the use of neutral density filter transmitting 50, 20, 15, 10, 7.5 or 5 % respectively. 2. 35 subjects were tested with reduced stimulus luminance by adjustment of the RGB settings such that four different stimulus luminances were defined, 64 cd/m2, 53 cd/m2, 41 cd/m2 and 33 cd/m2. 3. 19 subjects were tested with binocular stimulation in order to define the binocular summation by comparing the responses from monocular and binocular viewing. Stimulus luminance 33 cd/m2 was used to avoid a ceiling effect, which would hide the expected hit rate increase.

Results 1. A statistically significant reduction of mean hit rate was observed when filters transmitting 20% or less of the standard screen luminance were used.2. Significantly reduced mean hit rate and intra- and interindividual SD´s were observed at stimulus luminance 64 cd/m2 or less. 3. The mean hit rate to binocular stimulation, compared to the highest value from monocular stimulation in the same subject, was increased by a factor of 1.54, SD 0.45.

Conclusion The results in the current study indicate that microdots can identify some of the well-known features of the visual system, e.g. binocular summation and effect of age, provided that the stimulus luminance is carefully selected. The Rarebit Microdot Fovea may be useful for diagnosis in patients with age related macular degeneration or maculopathy in diabetes patients.

▪ 269

The influence of the cycloplegic in the objective refraction

JORGE J (1), QUEIRÓS A (1), FERNANDES P (1), ALMEIDA JB (2), PARAFITA MA (3)
(1) Physics (Optometry), Braga
(2) Physics, Braga
(3) Surgery (Ophthalmology), Santiago de Compostela

Purpose The purpose of this study was to compare refractions measured with an autorefractor and retinoscopy in cycloplegic and noncycloplegic eyes.

Methods The exams were performed on 199 right eyes from 199 healthy young adults. With a mean age of 21.6 ±2.66 years. These measurements were performed first without cycloplegia and repeated half one hour later with cycloplegia.Autorefraction was carried out with the ARK 700A. The retinoscopy was performed in each eye over the phoropter lenses. Data was analyzed using Fourier decomposition of the power profile.

Results The comparison of the autorefractor values with and without cycloplegic verifies that, for the component M, the autorefractor without cycloplegic yields more negative values (MARn vs MARc –0.86 ±0.79D), for the cylindrical vector J0 the autorefractor without cycloplegic yields more negative values (J0ARn vs J0ARc –0.05 ±0.11D), and for the J45 vector, the autorefractor without cicloplegic yields more positive values (J45ARn vs J45ARc 0.01 ±0.08D). The differences found for the M and J0 components are statistically significant. The comparison of the retinoscopy values with and without cycloplegic verifies that, for the component M, the retinoscopy without cycloplegic yields more negative values (MRETn vs MRETc –0.37 ±0.45D); for the cylindrical vectors J0 and J45 the autorefractor without cycloplegic yields more negative values (J0RETn vs J0RETc –0.01 ±0.11D; J45RETn vs J45RETc -0.01 ±0.07D). The differences found for the M component are statistically significant.

Conclusion The present results confirm that when performed by an experienced clinician, the retinoscopy is more accurate than automatic refraction giving a starting point to non-cycloplegic refraction.