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Presentation Abstract

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Abstract Title:	**Which Wavelenght is at Focus in White Light?**
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Abstract Body:	**Purpose:** It is commonly assumed that for white light stimuli, the eye would focus at a wavelength near to the maximum of its spectral response. However, this has not been elucidated yet by direct experiments. We used a new custom built adaptive optics instrument operating with invisible infrared (IR) illumination for measuring which is the selected wavelength at focus in white light, and if that is affected by the presence of monochromatic aberrations **Methods:** Defocus and the rest of monochromatic aberrations were measured in 6 young adult subjects (27 to 34 years old) using a Hartmann-Shack wavefront sensor incorporated in the adaptive optics visual simulator. Aberrations were obtained with invisible IR illumination (1050 nm) while subjects viewed a high contrast stimulus placed at infinity, consisting on a Maltese cross subtending 1 deg. The instructions given to the subject was to keep clear the vision of the stimulus at any time. The visual test was presented monocularly for 4 different illumination conditions, with no temporal constraints. Three monochromatic lights (10 nm bandwidth) centered at 450 nm, 550 nm, and 632 nm, and white light illumination from a thermal source were selected. For all subjects and conditions the experiment was repeated with both the natural aberrations, and with all aberrations corrected (leaving defocus free) **Results:** The adaptive optics instrument successfully allowed for measuring and correcting the eye's aberrations while subjects

viewed the visual test with different colors and in white light. The use of an IR invisible beacon light avoids unwanted effects during the measurements. Despite some individual variability, on average, results indicated that subjects accommodate at the wavelength where the eye exhibits its maximum sensitivity. Consequently, weighting the spectral emission of the source with the spectral response of the retina provides in most cases a good estimator of the preferred wavelength to be sharply focused at the retina. The correction of monochromatic aberration did not introduce significant changes in the average results of the experiment, although some differences were found among individuals. Most of the subjects exhibited less variance in the results when viewing the test with the aberrations corrected as compared with the case of vision through their natural aberrations

Conclusions:

Experiments using an adaptive optics visual simulator with an invisible measuring beacon support the idea that in white light, the eye focuses at the wavelength which maximizes the spectral sensitivity. The eye then seems to partially focus the stimuli compensating the chromatic aberration

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