RETINAL BRIGHTNESS AS AN INDICATOR OF ACCOMMODATION UNDER VARIOUS VISUAL LOAD LEVELS

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It is widely known that the retinal brightness depends on the accommodative state of an eye. Usage of light distribution across the pupil for measurement of the accommodation has already been described previously [1]. In our study, we detect the brightness of the retinal reflex to study the accommodative response to stimuli with various optical power and spectral distribution.

In the experimental part the optical setup shown in Figure 1 was used. The subject fixates the stimulus placed on the optical rail. While the subject fixates the stimulus an infrared beam illuminates the retina. Part of the

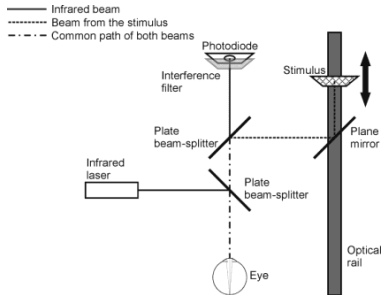

Fig. 1: The optical setup used in the experiment

reflected beam hits the photodiode driven by a light integrator. The light integrated determines the voltage up to which a capacitor is charged. The spectral power distribution is varied using three LEDs.

A numerical simulation based on a model eye was also carried out to model the response of the photodiode. The modelled calibration curve shows what the voltage level is for a certain dioptric strength of the stimulus. For a given dioptric stimulus the actual voltage level can be read from the curves showing the real response. By using the calibration curve, the real accommodation can be found and the accommodative response showing the actual response vs. the desired response can be obtained.

From the results shown for one subject (see Figure 2) it can be seen that stimuli with different spectral power distribution give rise to various accommodative responses as already found previously [2].

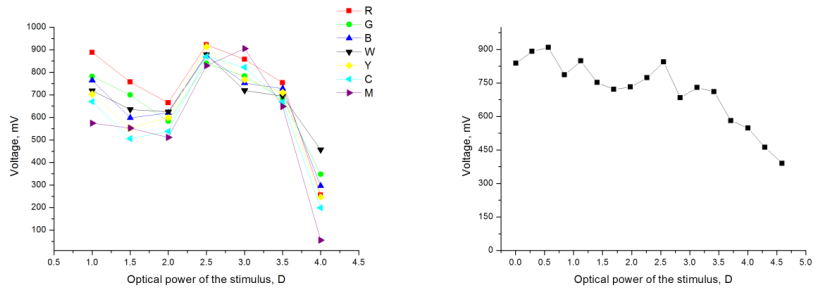

Fig. 2: Measurement curves for one subject (left) and the modeled calibration curve (right).

The method seems promising for analysing the accommodative response to stimuli with complex spectral power distribution and can be used to determine the optimal colour of the stimulus most comfortable for the accommodative system.

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