



AB019. A proposed test of stereovision to identify local retinal abnormalities

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Background: The human visual system extracts depth information from disparity in the images seen by the two eyes. The ability to calculate depth from disparity will be disrupted if local retinal abnormalities distort parts of those images, especially if these distortions are different in the two eyes. In its early stages, age-related macular degeneration (AMD) causes slight distortions in the central vision field which differ in the two eyes. AMD is the most common form of irreversible blindness in people over the age of 50. The goal of this project is to develop a stereoscopic perception test which leverages the sensitivity of binocular depth perception to detect the interocular differences symptomatic of either early-stage AMD or other diseases affecting the retina.

Methods: A program was written in MATLAB that allowed separate left and right eye stimuli to be shown to the two eyes. NVIDIA 3D Vision 2 stereoscopic glasses were used to present the stimuli. The test we have developed consists of random dot patterns covering the central 5 degrees of

vision. One or more disk-shaped perturbations in depth are displayed at different locations in the visual field of the subjects. Of the ten possible target locations, we present between one and four disks on each trial. The disks will only be visible if there is an undistorted input for that visual field location from the two retinæ. The participant uses a keypad to report the number of floating disks seen. A set of trials with randomized locations and numbers of disks is used to gather initial data on likely areas of stereoscopic vision deficit; afterwards, likelihoods for deficits in each location are calculated and used to generate customized subsequent trials.

Results: The software to perform the local stereovision test has been developed and is now being piloted. We are currently collecting data from healthy normal subjects prior to applying the test to clinical populations. In order to simulate the central vision distortions of AMD, patches of the stimulus for one eye are scrambled and blurred. This allows us to ensure that the task is functioning correctly.

Conclusions: The next step for this project is for it to be tested on ageing clinical populations to find its effectiveness in differentiating patients with normal sight from those showing early symptoms of AMD or other retinal abnormalities such as diabetic retinopathy. This test could represent a novel approach in early clinical detection of ocular disease.

Keywords: Age-related macular degeneration (AMD); stereovision; binocular disparity; stereoscopic perception

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