Peripheral Oculomotor Control Training in Healthy Individuals: Effects of Training and Training Transfer

Dylan Rose¹, Peter Bex¹
¹Northeastern University, Boston

Introduction
• Recent results suggest that explicit oculomotor training can produce "PRL-like" region of the retina among individuals with healthy vision. [1]
• May have implications for functional rehabilitation among individuals with retinal disease:
  1. Train individuals to select "optimal" retinal region for PRL.
  2. Speed re-development of PRL in response to changes in disease state.

Three primary research questions:
• Can we train a PRL-like region?
• Is there an optimal location for this PRL-like region?
• Will training at one PRL-like region transfer to another?

Methods

Subjects
• Eight individuals with normal or corrected-to-normal vision.
• Six women, two men.
• All subjects naive to the task.

Experimental Setup
• Data collected with Eyelink 1000 infrared eyetracker.
• Data collected at 1000hz sampling rate, 5-point calibration between experimental blocks, drift correction between trials.
• 1-meter viewing distance.
• Stimuli generated, experiment controlled using MATLAB Psychophysics, Eyelink toolboxes.

Experimental Procedure
• Task: subjects asked to guide gaze-contingent ring over randomly placed fixation target on the display.
• Position of gaze-contingent ring shifted either 128 pixels right of fixation ("east" condition) or below ("south condition") fixation. (see Figure 1 below for image of the task between these conditions).
• 400, 25-second trials, split into eight blocks of 50.
• Blocks 1-4, 5-8 separated by roughly a week (avg. 8.6 days).
• Orientation condition switched between blocks 1-4 & 5-8.

Results

Can eye movement training assist in the development of a stable PRL?
Does performance in terms of oculomotor control improve with training?
Yes:

Where is the optimal location for this PRL, if any?
No clear evidence for optimal PRL location.

Does training at one location transfer to a new location?
Yes, strong evidence for persistence of training between blocks, over time

Conclusions
• PRL training significantly improves oculo-motor control at the eccentric location, training effects persist across PRL orientation shifts.
• No clear evidence for optimum PRL location.

Future Directions
• Investigate effect of training on functional parameters of vision – CSF, reading performance, crowding, visual acuity.

References