AB061. Changes in eye movement strategies during a discrimination task in the presence of artificial central scotomas

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Background: The goal of the present research was to study whether the presence of an artificial central scotoma resulted in changes in eye movement strategies over the course of multiple days of training. We wished to determine how central vision loss, similar to age macular degeneration (AMD), affects eye movements, specifically the foveal-target alignment. We also wished to determine if an invisible compared to a visible scotoma led to delayed or different strategies, given that AMD patients are mostly unaware of their condition as they are unconscious of the presence of their central scotoma.

Methods: Eleven healthy participants (6 females, M =22.18, SD =1.94) were asked to perform a discrimination task, where they responded whether the orientation of an eccentric target (Gabor, 10 deg to the left of fixation) was clockwise or counter-clockwise. The target was surrounded by four distractor Gabors, thus making discrimination more difficult using peripheral vision. The target's orientation varied 10° clockwise to 10° counter-clockwise in 1° intervals. Each participant performed four blocks of 75 trials each per day over 10 days, the first day being a baseline as the participant were tested without any scotoma. We measured discrimination performance and precision (position of the eye in X and Y).

Results: Results showed similar patterns of discrimination reaction time and accuracy as well as changes to eye position for both the visible and the invisible scotoma conditions. Discrimination time significantly decreased on the last day of training compared to the first (first day M =2,965 ms, last day M =1,567 ms, $P<0.05$), while accuracy increased though not significantly so (first day =87.4%, last day =93.15%). There was no change in the final horizontal (X) position of first saccade relative to the target (first =–0.4°, last =–0.13°) but there was a significant upward shift (first =0.08° *vs.* last =0.58°, $P<0.05$); participants shifted their eye position on the Y axis so that they were looking at a point slightly above the target.

Conclusions: These findings suggest that the presence of an artificial central scotoma induces both changes in saccade planning mechanisms as well as changes in peripheral visual function, possibly attentional, resulting in improved discrimination performance. This study allows a better comprehension of eye movement and attentional strategies during central visual loss and provides insight into possible rehabilitation strategies.

Keywords: Adaptation; scotoma; vision; eye; age macular degeneration (AMD); significant results

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