ARVO Annual Meeting Abstract: A novel testing paradigm for assessing eye movements during a visual task

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Publication date
2015

Published in
Investigative Ophthalmology & Visual Science

Citation (APA)
Melman, T., Diniz-Filho, A., Boer, E., Abe, RY., Gracitelli, C., Baig, S., & Medeiros, FA. (2015). ARVO Annual Meeting Abstract: A novel testing paradigm for assessing eye movements during a visual task. *Investigative Ophthalmology & Visual Science*, *56*(7), 2925.

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ARVO Annual Meeting Abstract | June 2015

A Novel Testing Paradigm for Assessing Eye Movements during a Visual Task

Timo Melman; Alberto Diniz-Filho; Erwin R Boer; Ricardo Y Abe; Carolina Gracitelli; Saif Baig; Felipe A Medeiros

+ Author Affiliations & Notes

Investigative Ophthalmology & Visual Science June 2015, Vol.56, 2925. doi:

Abstract

Purpose: To evaluate a new test paradigm for saccadic and smooth pursuit eye movement performance during an attentional and visual performance-based task.

Methods: Subjects underwent three tests to assess saccadic and smooth pursuit eye performance. In each test the subject performed 20 saccades. In each trial a square with 3 possible different levels of contrast was presented in the middle of a LCD screen. Saccadic eye movements were induced by new squares appearing randomly every 3-6 seconds around the initial square. Subjects were instructed to fixate the new target as quickly as possible. If a successful fixation was observed the square disappeared. In the first test one new target appeared each time. In the second test two targets of different sizes appeared and the subject was instructed to move the eyes towards the smaller target as quickly as possible. In the third test, two equal sized squares appeared, but one of the two squares was displayed with a 0.1 second delay. The eye movements were synchronized with the test dynamics during each performance test using the SMI Eye Tracking Glasses (SensoMotoric Instruments GmbH, Teltow, Germany). Free head movements were

allowed in order to establish natural movements of the eye-head complex. The influence of different contrast levels on the latency of saccadic eye movement was assessed. Reaction time, maximum saccade velocity, number of initial direction errors, and settling time were used as metrics.

Results: Five healthy subjects with mean age of 39.8 ± 18.4 years (range: 18 - 60 years) were included. There was a strong and positive correlation between mean reaction time and age (P = 0.002). The results also showed a significant negative correlation for age and number of initial direction errors (P = 0.050).

Conclusions: These preliminary results showed an age-related-degradation in saccadic reaction in response to a visual task and in number of initial direction errors in normal participants. An explanation could be that older subjects use a more top down method to perform the experiment, where younger people use the faster bottom up method instead. The proposed paradigm with free head movements may help integrate the study of eye movements and visual performance for evaluation of diseases such as glaucoma.

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