

The perception of coherent motion for the centric and eccentric fixation of a stimulus

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Introduction

Visual information perception is quite variable throughout a retina. The fovea is responsible for visual acuity; moving to the periphery, visual acuity decreases rapidly, the number of photoreceptors and ganglion cells also decreases, but the size of receptive fields increases. [1] That is why retinal periphery is more sensitive to low spatial frequencies, high temporal frequencies, high motion velocities and contrast. However, the central part of the retina has smaller receptive fields, and is, respectively, sensitive to high spatial frequencies, low temporal frequencies, low motion velocities and colours. [2],[3] So, our hypothesis was: The thresholds of motion perception are lower for the eccentric parts of a retina. The aim of our experiment was to analyse, which type of fixation results in the lower thresholds of perception of coherent motion and to evaluate the errors.

Methods

Participants: 7 people, the average age -19,6 years. **Methodology:** The thresholds of coherent motion were evaluated using RDK. 160 black dots (7' each), 12°x12° presentation field, working distance - 60 cm, motion speed - 2°/s, exposition - 400ms, eccentricity - 12°. Viewing with the dominant eye.

Results

1. For 2 out of 7 participants it was proven that the thresholds for central and eccentric fixations are statistically different. In others, a similar pattern was detected, but it could not be statistically proven.

2. The analysis of the mean thresholds for the perception of coherent motion shows that it is significantly lower ($p < 0,05$) for the eccentric fixation. For central fixation the threshold is $13,6 \pm 1,6\%$, for the eccentric one - $9,1 \pm 0,7\%$.

3. For the first and the fifth analysis using Bland-Altman, there is the effect of learning apparent for central fixation, but not for the eccentric one. The variation of results for 5 measurements is significantly higher for the thresholds for central fixation ($2SD = \pm 14,4\%$) than it is for the peripheral one ($2SD = \pm 4,1\%$) ($p < 0,05$).

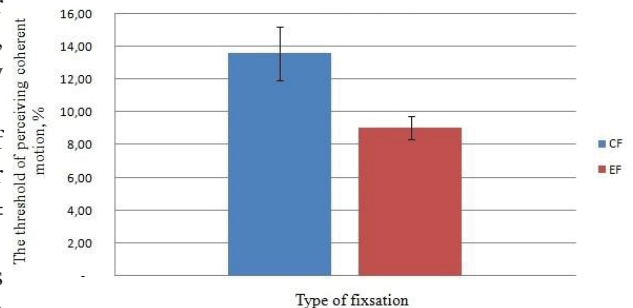


Figure 1: The mean thresholds of the perception of coherent motion for central and eccentric fixation.

Conclusions

The results confirm the hypothesis that states that the peripheral receptive fields perceive the coherent motion better, showing lower thresholds and lower data variation, as well as for the eccentric fixation the effect of learning does not occur.

For further research it would be advisable to increase the number of participants and change the methods in order to confirm that the methodology chosen does not affect the results.

References

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