

Introduction

Blur perception and sensitivity is important factors of visual quality because of the connection with control of the accommodative response. Many studies have investigated blur detection threshold that is related to depth of focus. In this study we wanted to acquire more information about, firstly, other blur perception aspects; secondly, object's size influence on blur perception; thirdly, influence of blur adaptation on blur perception; and, fourthly, influence of refractive group on study results.

Method

Participants

18 participants (9 emmetropes, 9 myopes), age 19-23 years

Stimuli

Optotypes: Landolt rings: 5 and 10 min of arc, 4 different directions
Blur simulation: Gaussian low pass filter
Stimuli were presented on the computer screen, distance 5.10 m

Subjective thresholds

- Blur level gradually increases:
- Just noticeable blur - JNB (participant for first time notices blur in image)
 - Unrecognizable optotype (blur level increases till participant incorrectly names)
 - Blur level gradually decreases:
 - Orientation (participant notices direction of an irregularity in blurred spot)
 - Recognition (participant perceives object as Landolt ring and for first time correctly identifies its direction at least 3 out of 5 times)
 - Clear image (first time when participant describes image as clear/sharp)



Acknowledgements

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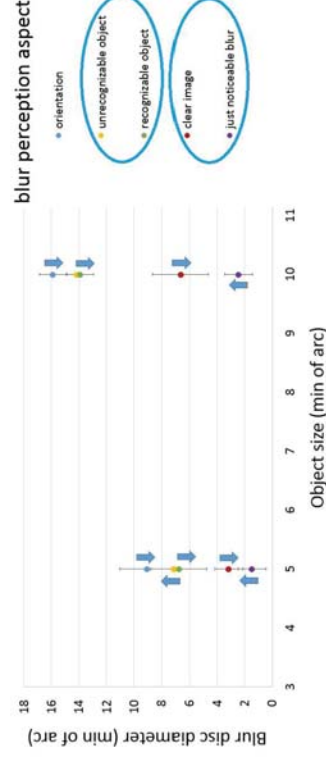
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Results

The effect of stimulus size on blur sensitivity

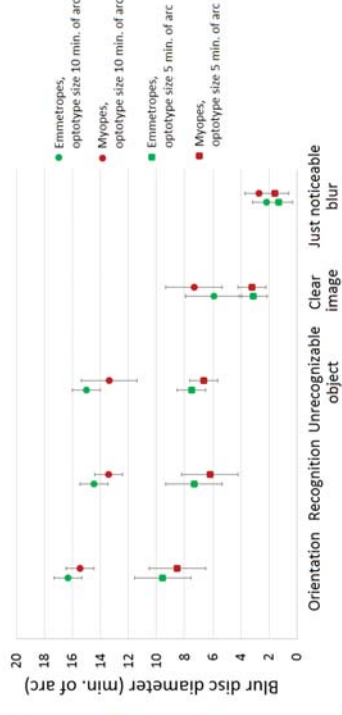


Blur tolerance increases with stimulus size.

Larger blur disc diameter is necessary for larger optotype to produce equal blur level perception.

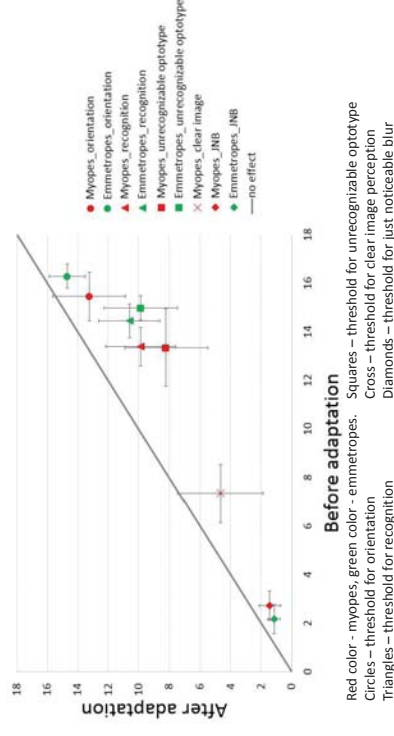
Difference between just noticeable blur and clear image perception threshold increases with stimulus size.

The effect of refractive group



Statistically significant difference between refractive groups was not observed. However, for clear image perception and just noticeable blur perception thresholds myopes showed larger blur tolerance than emmetropes.

The effect of blur adaptation



Participants were adapted to 1,0 D simulated myopia for 30 minutes (optical blur with ophthalmic lenses).

Mean values for each blur perception threshold and refractive group are presented. Grey line represents no effect of blur adaptation (30 min, optical blur - simulation of 1,0 D myopia).

Position of data point below «no effect» line shows that blur sensitivity has increased.

For myopes thresholds decreased on average by 27 - 48 % (for different blur perception aspects) after adaptation.

For emmetropes thresholds decreased on average by 10-42 % after adaptation.

Conclusions

Thresholds increase for all blur perception aspects with stimulus size because the effect of the specific blur disc diameter reduces.

Results show that the difference between the thresholds of clear image perception and just noticeable blur increases for larger size of the optotype.

Statistically significant difference between refractive groups was not observed.

Adaptation to additional optical blur increased blur sensitivity by 10 - 48 % according to threshold and refractive group.