

Impact of mental fatigue on perception of biological motion

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Introduction

The drivers at the wheel must be able to assess what is happening on the road on different weather conditions to prevent traffic accidents. Fatigue affects the driver's attention. It could be decreased and it can improve the detection of biological motion. The purpose of our research is to evaluate mental fatigue impact on ability to detect biological motion. Our tasks were: (1) to evaluate effect of different noises on detection of biological motion, (2) to evaluate the effect of day-time on test performance, (3) to estimate the threshold of noises when biological motion is detected in the condition of mental fatigue.

Method

Stimuli consisted from biological and non-biological motion in noise presented on computer screen. Non-biological motion was close to human gait and moving in same frequency. 106 subjects in age 12-55 participated in this study. Data analysis with MS Excel programm Anova was done from results of 73 participants, results from other 33 contained factor of error more than 0,4. There were 86 female and 20 male participants. Test began with noise which is represented by 2000 dots. Points decreased gradually - 100 per second. Subject task was to perceive motion and to detect what kind of motion it was (normal or scramble). Biological or non-biological motion every time was presented on different areas of screen. There were biological motion (right, left, forward) and five noises (left-right in 45 degrees, right-left in 45 degrees, top-down, random and quasi-random). To make task more difficult contrast was reduced.

Results

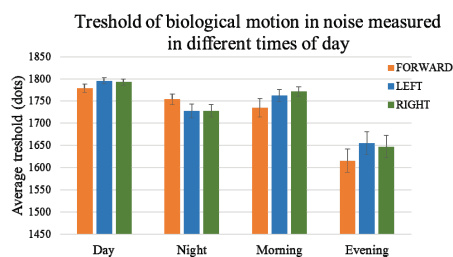


Figure 1. Threshold of biological motion in noise measured in different times of day

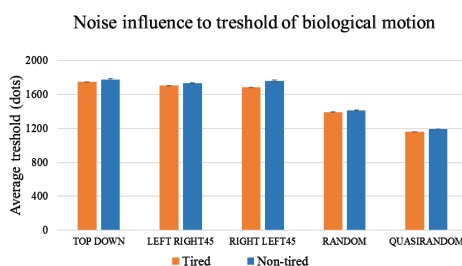


Figure 2. Noise influence to threshold of biological motion

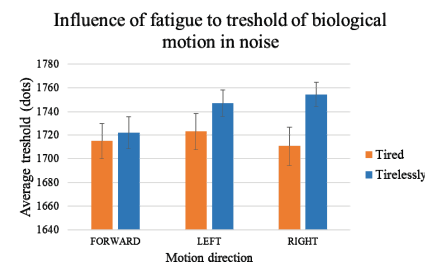


Figure 4. Influence of fatigue to threshold of biological motion in noise



Figure 3. A. Biological motion without noise. B. Biological motion with noise. In the tests contrast was reduced.



Biological motion perception was dependent on time of the day. The threshold of noise when was possible to detect motion in evening was 1639 dots (+/-15 dots), while in other times average threshold was 1760 dots (+/-4 dots). The threshold of biological motion perception in random and quasi-random noises were lower than in top-down, left-right and right-left in conditions. We found the impact of fatigue on threshold of weather simulated noises, in all cases non-tired subjects shoed better results which were statistically different from tired subjects. There is a significant difference between the detection of normal biological motion and scramble motion in weather simulated noises, threshold for normal biological motion is higher. Non-tired subjects showed significantly better results in determination of motions direction (forward, left, right). Results shows that subjects who play computer games achieve higher results, than subjects who do not. Also participants who participates in sports activities weekly, reach higher threshold.

Literature

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