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INVESTIGATING THE EFFECT OF A VISUAL SEARCH TASK FOR SIMULATOR-BASED DRIVER TRAINING

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Background

Novice drivers tend to direct their gaze to the road ahead and not scan the environment properly. This study investigated the training effectiveness of a visual search task in a driving simulator, aimed at increasing young drivers' spread of visual search.

Method

Participants were instructed to perform a lane keeping task while peripheral visual cues were to be detected and fixated. Low saliency and random appearance of these stimuli prevented bottom up (i.e., stimulus driven) responses, resulting in active visual search.

Two groups of inexperienced drivers were tested. One group received a visual search training (14 participants) and a control group (16 participants) drove without visual search training.

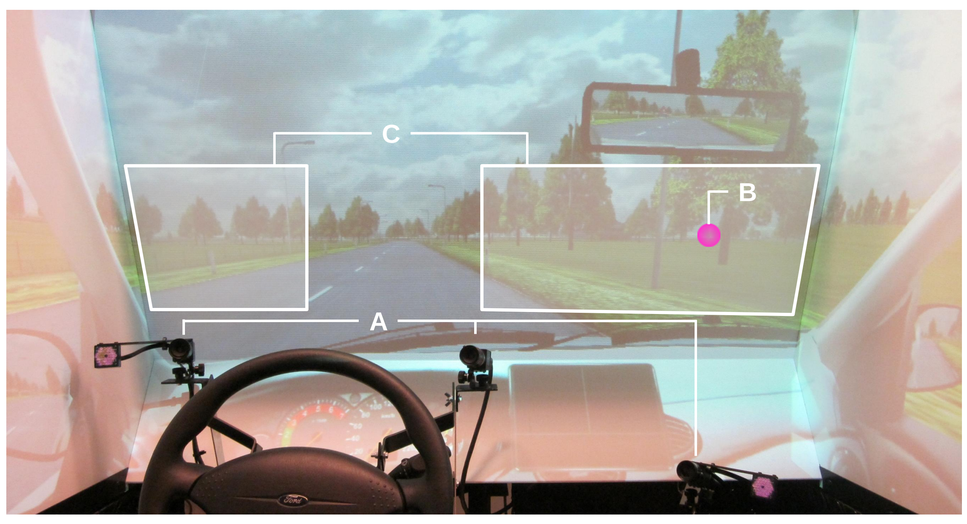

Figure 1. Simulator setup (A = eye tracker, B = example of an appearing dot, C = areas where the dots appeared).

The visual search training consisted of randomly appearing purple dots (20mm in diameter) in the periphery. The dots faded in, and when subjects fixated on a dot for 350 ms the dot would disappear and a next dot would randomly appear.

All participants drove four training sessions in a rural environment and one transfer session in an urban environment with various hazardous situations. During the transfer session the visual search task was disabled.

Table 1. Experimental groups

	Session 1	Session 2	Session 3	Session 4	Session 5
N=14	Training	Training	Training	Training	Transfer
N=16	No Training	No Training	No Training	No Training	Transfer

Figure 2. Rural driving environment (left) during training sessions and urban driving environment during retention (right).

Results

During the training sessions, a significantly higher visual search was observed for the training group.

No differences were found in the transfer session between both groups.

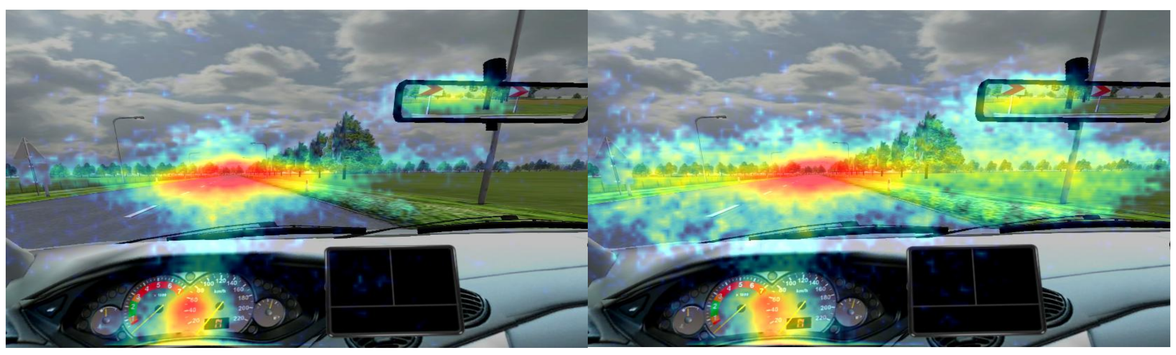

Figure 3. Gaze distribution for the control (left) and training group (right) for all participants in the 4th session.

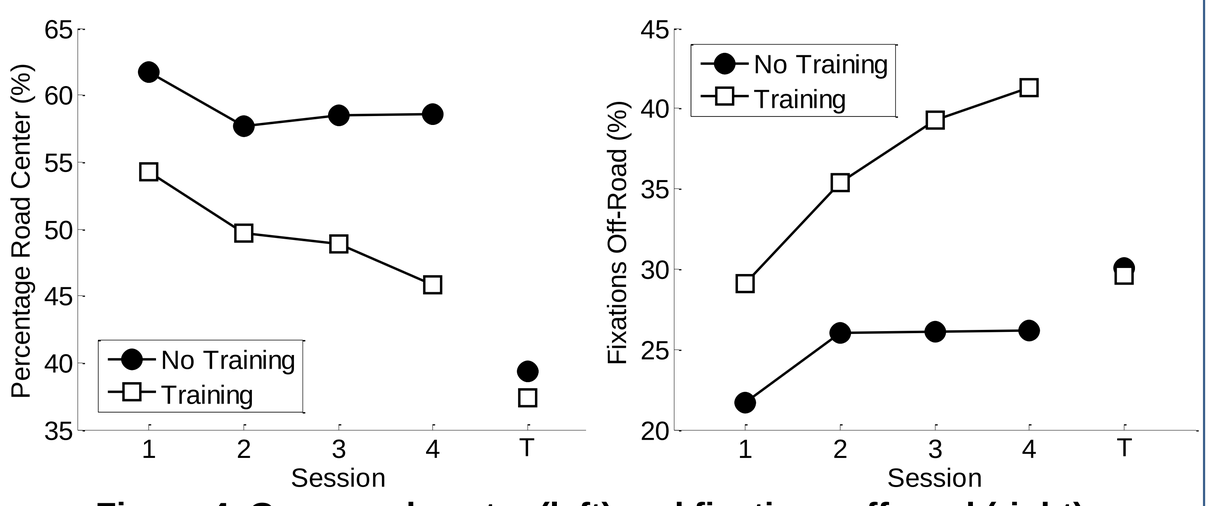

Figure 4. Gaze road center (left) and fixations off-road (right).

A significant performance improvement in target response time and target miss rate was found during the training sessions.

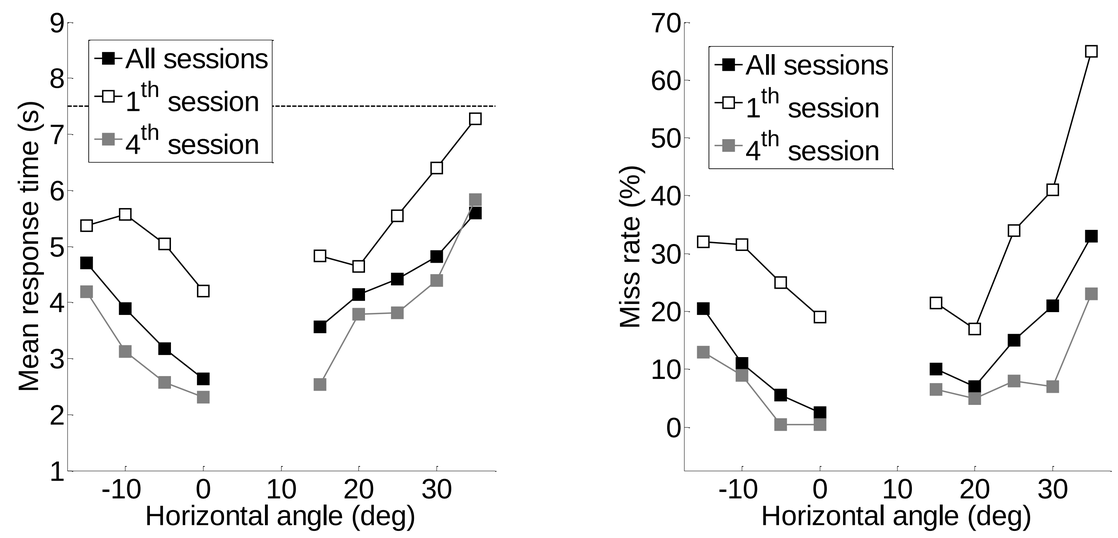

Figure 5. Distribution of mean response time (left) and percentage of missed targets as a function of horizontal view angle (right).

Conclusions

No differences in eye-scanning and driving behavior were detected between the two groups, i.e. the training effects did not detectibly generalize to the new condition.

The group who performed the visual search task while driving became increasingly better at detecting the visual targets, and significantly increased their visual search during training.

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