The development of a cognitive skills training to support driver education
Comparing performance of experienced and trained learner drivers

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Introduction
- Crash numbers of novice drivers are alarmingly high (e.g. OECD, 2006).
- One central explanation: deficits in cognitive skills such as hazard perception (e.g. Finn & Bragg, 1986).
- Conventional forms of driver training have largely failed to build up those skills.
- Examples show the potential of computer-based trainings (CBTs) in this regard (e.g. Fisher et al., 2002).
- However, effects of available CBTs have mostly been found when compared to untrained control groups, whereas it is unclear how this “improved” behaviour relates to the behaviour of experienced drivers.
- By testing a group of experienced drivers on the same scenarios that we used in a previous experiment in which we assessed the effects of a CBT (Petzoldt et al., 2013), we tried to create a benchmark against which to compare the learner driver performance from our earlier study.

Method
- Three groups of drivers:
  - (learner driver) CBT group and (learner driver) control group (data from previous study).
  - Young “experienced” driver group (average driving experience of ca. 65,500 km).
- CBT training for CBT group, irrelevant task for control group, no task for experienced group.
- Simulator test (Fig. 2), situations (nine analysed) constructed to reflect content of the CBT to a varying degree.
- 36 usable data sets (because of eye tracking issues).
- Coding of glance sequences, first completion of critical glance sequence (from hazard indicator to relevant area) as central dependent measure.
- Coding of driver behaviour in analysed situations as either optimal, suboptimal or inappropriate.

Results & Conclusions
- CBT group learner drivers showed performance similar to experienced drivers in the glance measure, both performed better than control group (Fig. 3).
- Differences in rated handling of three of the test situations (ceiling effects in the other situations) - experienced drivers outperformed both learner driver groups (Fig. 4).

Computer Based Training
- Three parts:
  1. A pre-test on theoretical knowledge, (1) a pre-test on theoretical knowledge,
  2. An instructional phase, and (2) an instructional phase, and
  3. The actual training (3) the actual training.

Actual training
- Short clips of traffic scenes, embedded in a Flash environment.
- Display of potentially hazardous situations.
- Two different sessions, 13 video clips each, approx. 45 min to complete one session.

Fig. 1: Example for multiple choice item.

Fig. 2: TUC Driving Simulator

Fig. 3: Difference in time until completion of relevant glance sequence compared to control group, separate for each situation (numbers on x-axis indicate situation).

Fig. 4: Performance as rated by experts for three of the critical situations.

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References