Optimizing the human-machine interface for take-overs

EXPERIMENT 1 – PERIPHERAL MONITORING

Summary: Peripheral monitoring of traffic during engagement into a visual non-driving related task in the head-up display does not result in better take-over performance.


EXPERIMENT 2 – CONCEPTION AND EVALUATION OF SUPPORTIVE INFORMATION IN THE HEAD-UP DISPLAY FOR TAKE-OVER SITUATIONS

Does additional information in the head-up display (HUD) during the take-over increase the subjective and objective take-over performance?

METHOD

- Driving simulator (static) study
- n = 40, mean = 31 years (SD = 13y)
- NDRT: Surrogate reference task, SuRT (for all participants)

Experimental design

Within subject factor: situation / obviousness of reason for take-over
- Construction site
- Curve in heavy rain
- Obvious reason
- Imperceptible reason

Between subject factor: HMI
- HUD
- No HUD

Measures

- Eye tracking (percentage eyes on road, PEOR)
- Time and quality aspects of take-over performance (take-over time, accelerations, time-to-collision)
- Subjective parameters (criticality, obviousness of reason for take-over, usefulness, satisfaction)

RESULTS

Vehicle dynamics

No significant differences between the situations and the groups with/without head-up display.

Eye-Tracking

The group with additional information in the HUD shows a significantly higher PEOR.

Subjective Rating

HUD group: significant better rating for
- Obviousness of reason for Rti
- Usefulness and satisfaction
- Perceived safety and efficiency of the HMI
- Desire to buy and use

SUMMARY

Additional information in the head-up display during a take-over improves the subjective rating by drivers.