

## **Behavioural adaptation to an enforcement and tutoring system –A driving simulator study**

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### **Abstract**

Aim of the DETER (Detection, Enforcement & Tutoring for Error Reduction) project is to develop a tutoring and warning system that increases traffic safety by reducing the number of traffic violations. Detected deviations from normative behaviour trigger feedback and tutoring messages of the system. In case a tutoring message is not followed, the system has the capability of forcing behaviour adaptation by means of registration and punishment.

A prototype of this system was tested in a simulator. During the study driving parameters, mental load indicators, and subjective ratings of acceptance were collected. Two groups of drivers of different capabilities were tested, elderly and relative young drivers.

The feedback and tutoring messages were found to be successful in decreasing the number and the extent of traffic law violations. In a situation with relative high information load drivers were more likely to make the 'safe decision' when driving with the enforcement system switched on, as compared with driving without the system. However, mental effort, both reported on a subjective rating scale and measured as reduced heart rate variance, was slightly increased during tutoring.

All drivers consider the system useful, elderly drivers use the system as driver support. Younger drivers found the system less pleasant than did elderly drivers.

### **Introduction**

Only in a minority of cases has the technical state of the vehicle or road been shown to be the principal cause of a traffic accident. Human error causes most of them (e.g., Smiley & Brookhuis, 1987); very frequently a driver's misjudgment of a traffic situation or a misperception precede a crash. Apart from inaccurate perceptions, reduced overall vigilance, as a result of sleep deprivation, alcohol or drug use, also contributes to the amount and seriousness of accidents. Given the diversity of possible traffic errors and the fact that these situations occur in a wide range of circumstances it is remarkable that most errors are covered by traffic law. A driver who misses a one-way sign and enters this road from the wrong direction is violating