

## Secondary tasks while driving effects and countermeasures

M. Vollrath<sup>1</sup> I. Totzke<sup>2</sup>

<sup>1</sup>*Institute of Transportation Systems (IFS), German Aerospace Center (DLR) Braunschweig, Germany  
e-mail: mark.vollrath@dlr.de*

<sup>2</sup>*Center for Traffic Sciences (WIVW), University of Wuerzburg, Germany*

subm. 28<sup>th</sup> April 2005

approv. after rev. 28<sup>th</sup> July 2005

---

### Abstract

The study evaluates the possibility to avoid negative effects of secondary tasks by either designing secondary tasks to use different resources than needed for driving or by reducing the driver's workload by means of an advanced driver assistance system. 5 subjects drove in a driving simulator with and without two different secondary tasks with and without an assistance system in a within-subjects design. The secondary task requiring the same resources as the driving task interfered more strongly with driving than the other task. However, even for this secondary task negative effects were found in special situations, e.g., car-following at straight sections of the road. Thus, not all problems introduced by secondary tasks may be solved by simply using different resources. The assistance system resulted in much better lane-keeping even when engaging in the secondary tasks. Thus, driver assistance systems can be adapted to counteract negative effects of secondary tasks.

*Keywords - Divided attention, dual-task, multiple resources, advanced driver assistance system, driving behaviour*

---

### 1. Introduction

Technological developments lead to an increasing number of information systems becoming available in the car. For the driver, using these systems may be regarded as a secondary task which requires resources some of which are also needed for driving. The most prominent example encouraging a heated public debate is the use of mobile phones while driving. Results from epidemiological studies [e.g.,12;14;15;16] as well as from experimental studies [e.g.,1;2;3;4;5;6;7;10] indicate that using a phone while driving may increase accident risk because attention is withdrawn from the primary task of driving. Thus, efforts are taken to counteract this risky behaviour. In Germany, for example, since the beginning of 2001 only hands-free use of mobile phones is allowed when driving. As some of the results of the experimental studies cited above indicate that the negative effects of using a phone may not result from handling the phone but from talking on the phone (or concentrating on the content) this law will have a dubious impact at best. However, completely banning the phone from the car in order to stop drivers from talking to someone on the phone will hardly be possible as in this case talking to passengers is to be prevented. Moreover, the technical industry is rapidly developing new communication devices for in-vehicle use as, for example, internet browsers.