Monday 15 May at 14:00

Workshop in the framework of the
Fourth United Nations Global Road Safety Week
in 14 May 2017

Save Lives
#SlowDown

The future of road safety research

NTUA Zografou Campus, Athens
Railways Amphitheatre of the
Department of Transportation Planning and Engineering

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Monitoring Driver Distraction Distract

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Together with:
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Distract Project

**Title:** DISTRACT – Causes and impacts of driver distraction: a driving simulator study

**Objective:** The analysis of the effect of road, traffic and driver risk factors on driver behaviour and accident probability at unexpected incidents, with particular focus on distracted driving

**Duration:** 2012-2015

**Funding:** Ministry of Education, Lifelong Learning and Religious Affairs (NSRF programme)

**Members:** An interdisciplinary research team:
- Dpt. of Transportation Planning and Engineering NTUA
- Dpt. of Neurology of the University of Athens Medical School, UoA
- Dpt. of Psychology, School of Philosophy, Pedagogy and Psychology, UoA
The problem

- **Human factors** are the basic causes in 65-95% of road accidents (Salmon et al., 2011)

- Human factors involve a large number of specific factors that may be considered as accident causes, including **Driver Distraction**

- Driver distraction may include four different types: **physical** distraction, **visual** distraction, **auditory** distraction and **cognitive** distraction (Ranney et al., 2000)

- Driver distraction factors can be subdivided into those that occur **outside the vehicle** (external) and those that occur **inside the vehicle** (in-vehicle)
Methodological challenges

- Design and implementation of a **simulator experiment** aiming to deal with the majority of limitations that have been noted in the assessment of the examined simulator studies:
  - Large and representative **sample**
  - **Randomisation** of trials
  - Adequate **practice drive**
  - Investigation of an optimum number of **driving factors**

- Development and application of an **innovative statistical analysis methodology**

- Need to demonstrate a composite driving performance measure in order to examine driver distraction as a **multidimensional phenomenon**
Experimental procedure

A driving simulator experiment took place based on the following conditions

**Area type**
- Urban area (2.1 km long, single carriageway)
- Rural area (1.7 km long, separated by guardrails)

**Traffic scenarios**
- Low traffic (QL=300 vehicles/hour)
- High traffic (QH=600 vehicles/hour)

**Distracted Conditions**
- Cell phone use
- Conversation with the passenger

**Unexpected incidents**
- Child crossing the road
- Sudden appearance of an animal
Analysis framework

Data for 95 participants were collected from the driving simulator experiment and analysed by means of a dedicated statistical analysis method including:

- **Descriptive analysis** (correlation tables, boxplots)
- **Regression analysis** (6 general linear mixed models)
- **Factor Analysis** (2 factor analysis)
- **Latent analysis** (4 structural equation models)

**Questionnaires**

- Driving behaviour questionnaire
- Self-Assessment and memory questionnaire
Main findings (1/2)

• Two unobserved (latent) variables have been developed regarding overall **driving performance** and **driver error** based on driving simulator parameters.

• The effect of **several risk factors** has been quantified directly of driving performance, driver error and accident probability at unexpected incidents.

• **Driver characteristics** play the most crucial role in overall driving performance (gender, age, experience, education).

• Neither conversing with a passenger nor talking on the cell phone has a statistical significant impact on **driver error**.
Main findings (2/2)

• Results regarding the effect of driver distraction indicate the different effect on driving performance between cell phone use and conversation with the passenger.

• Development of risky driver profiles regarding driver error and accident probability at unexpected incident:
  • more likely to commit driving errors are young or old female drivers at urban areas.
  • more likely to be involved in an accident at an unexpected incident are female drivers in low traffic conditions while talking on the cell phone.
Future challenges

• Driver distraction demonstrates a continuously increasing prevalence becoming a major road accident risk factor.

• Investigation of the different types of driver distraction from the different new technology devices is necessary

• There is need for further investigation of the distracted driver compensatory behaviour.

• Structural Equation Models are very useful in analysing large data sets on driver safety behaviour.
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