Ageing and Safe Mobility

International interdisciplinary conference

27th and 28th November 2014

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Is distracted driving performance affected by age? First findings from a driving simulator study

P. Papantoniou, C. Antoniou, E. Papadimitriou, D. Pavlou, G. Yannis, J. Golias

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Outline

- Background
  - Older drivers characteristics
  - Driver distraction
- Objective
- Driving simulator experiment
  - Overview of the experiment
  - Driving at the simulator
  - Experiment design
- Analysis method
- Results
- Conclusions and Discussion

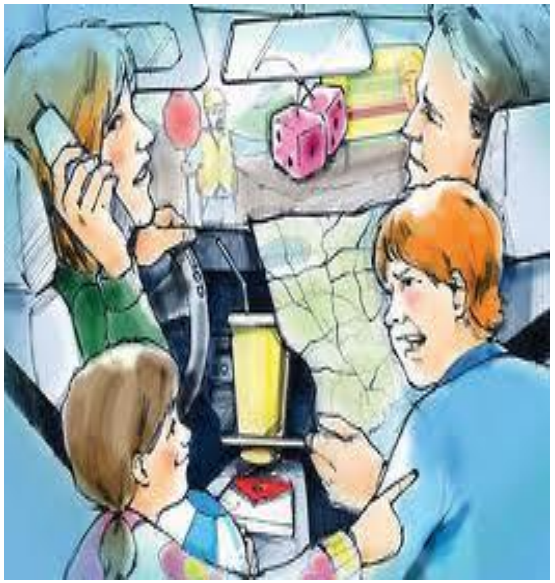
Older drivers characteristics

- Older drivers have a relatively high fatality rate due to:
  - functional limitations
  - physical vulnerability
  - low annual mileage
- Particular Older Driver Behaviour characteristics
  - driving habits
  - social behaviour
  - risk compensation
  - changing behaviour over time

Driver distraction

- Driver distraction is defined as “a diversion of attention from driving, because the driver is temporarily focusing on an object, person, task or event not related to driving, which reduces the driver’s awareness, decision making ability and/or performance, leading to an increased risk of corrective actions, near-crashes, or crashes” (Young and Regan, 2007)

- **Basic distraction experiment characteristics**
  - **Distraction source** (mobile phone, conversation with passenger, music, eating, visual, cognitive etc.)
  - **Sample characteristics** (size, gender, age distribution, benefits, questionnaire)
  - **Experiment design (**Practice trial, trial duration, counterbalancing, road environment, traffic conditions)
  - **Driving related Outcomes**



Overview of experiment

- Driving simulators allow for the examination of a range of driving performance measures in a controlled, relatively realistic and safe driving environment
- A driving simulator experiment was carried out within the framework of the Distract and the DriverBrain research projects

distrACT

driverBRAIN

Department of Transportation Planning and Engineering, NTUA

Department of Neurology, Psychiatry and Social Medicine, UoA

Department of Psychology, UoA

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Objective

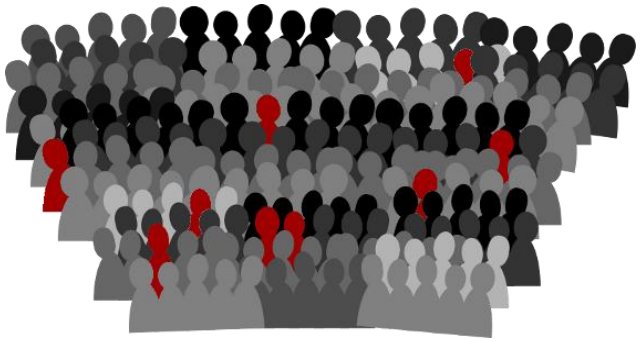
The objective of this research is the investigation of the effect of age on distracted driving performance

Driving at the simulator

- Driving simulator
  - Foerst Driving Simulator (1/4 cab)
- Road environment
  - Rural: 2.1 km long, single carriageway
- Traffic scenarios
  - QL: Low traffic - 300 vehicles/hour
  - QH: High traffic - 600 vehicles/hour
- Unexpected incidents at each trial
  - Child crossing the road
  - Sudden appearance of an animal

Experiment design

- Randomization
  - The purpose of randomization is to remove bias and other sources of extraneous variation, which are not controllable
- Familiarization
  - the participant practiced in handling the simulator, keeping the lateral position of the vehicle, keeping stable speed, etc
- Sample
  - 26 young drivers (18-34)
  - 24 middle aged drivers (35-54)
  - 22 older drivers (55+)



Analysis method

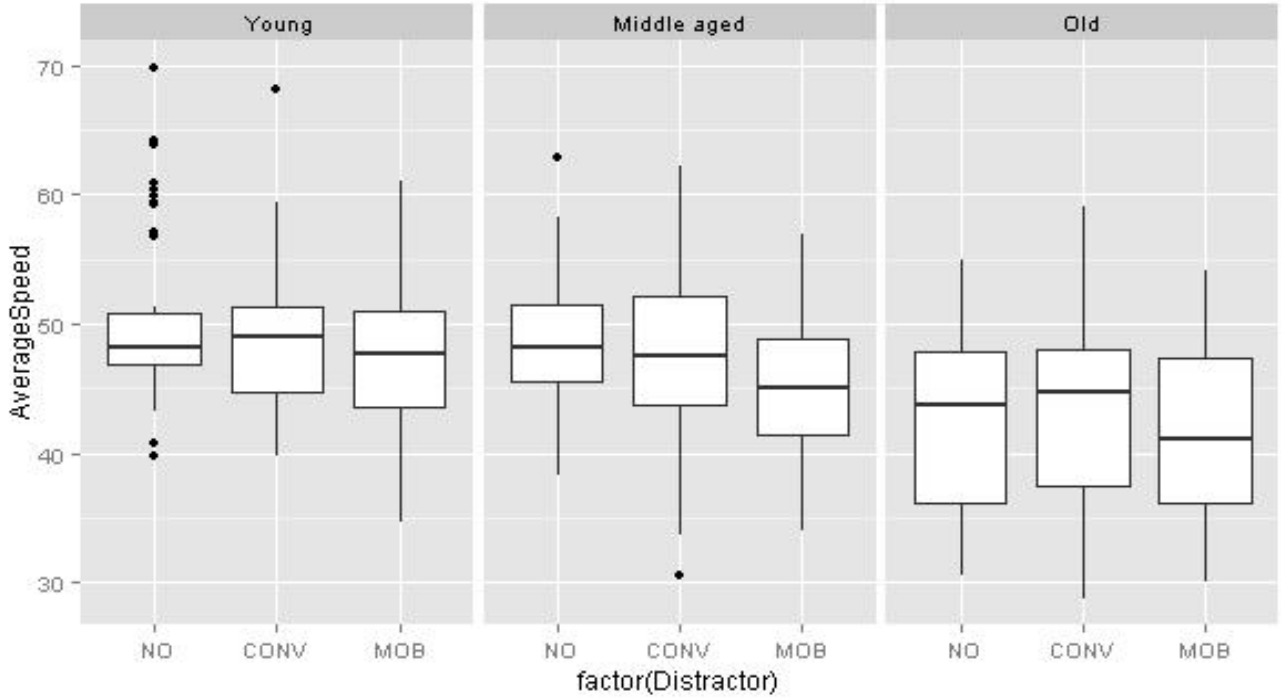
Key measures analysed

- Mean speed
- Mean headway
- Standard deviation of lateral position
- Reaction time

Boxplot descriptive analysis

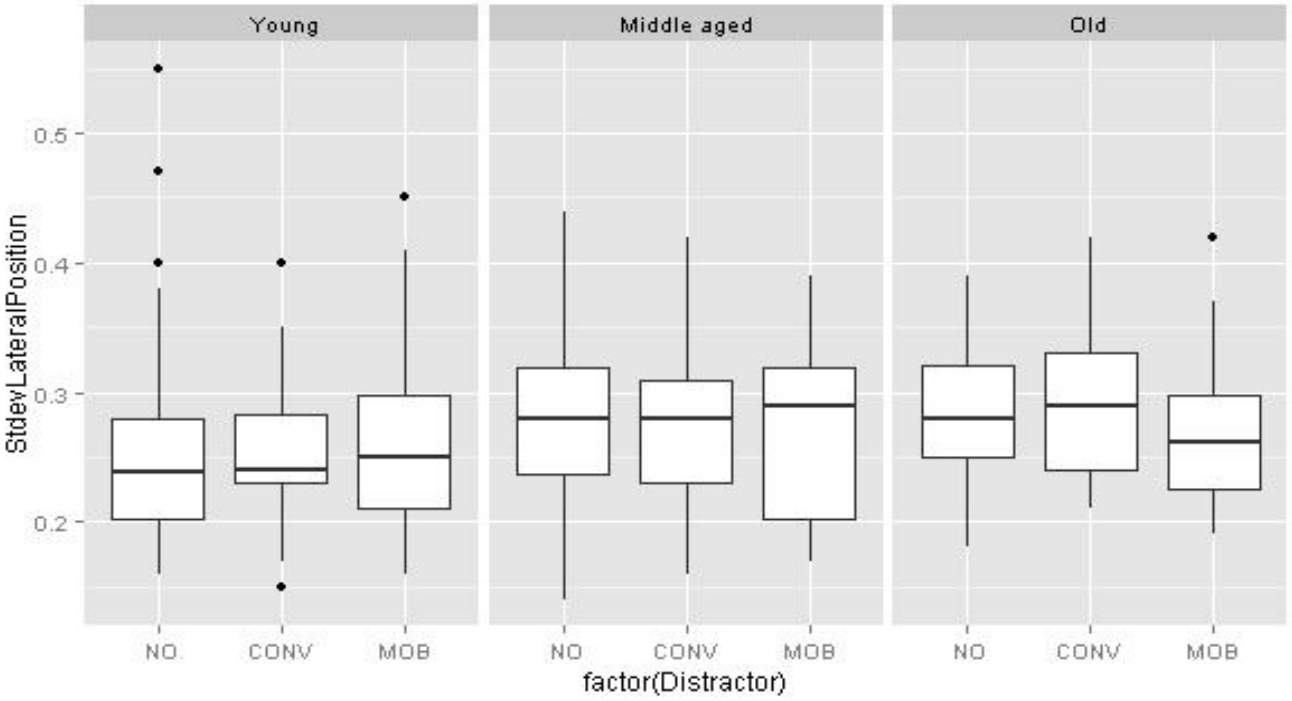
- The line in the middle of the boxes is the median
- The bottom of the box indicates the 25th percentile
  - Twenty-five percent of cases have values below the 25th percentile.
  - The top of the box represents the 75th percentile.
  - Twenty-five percent of cases have values above the 75th percentile.

Mean speed



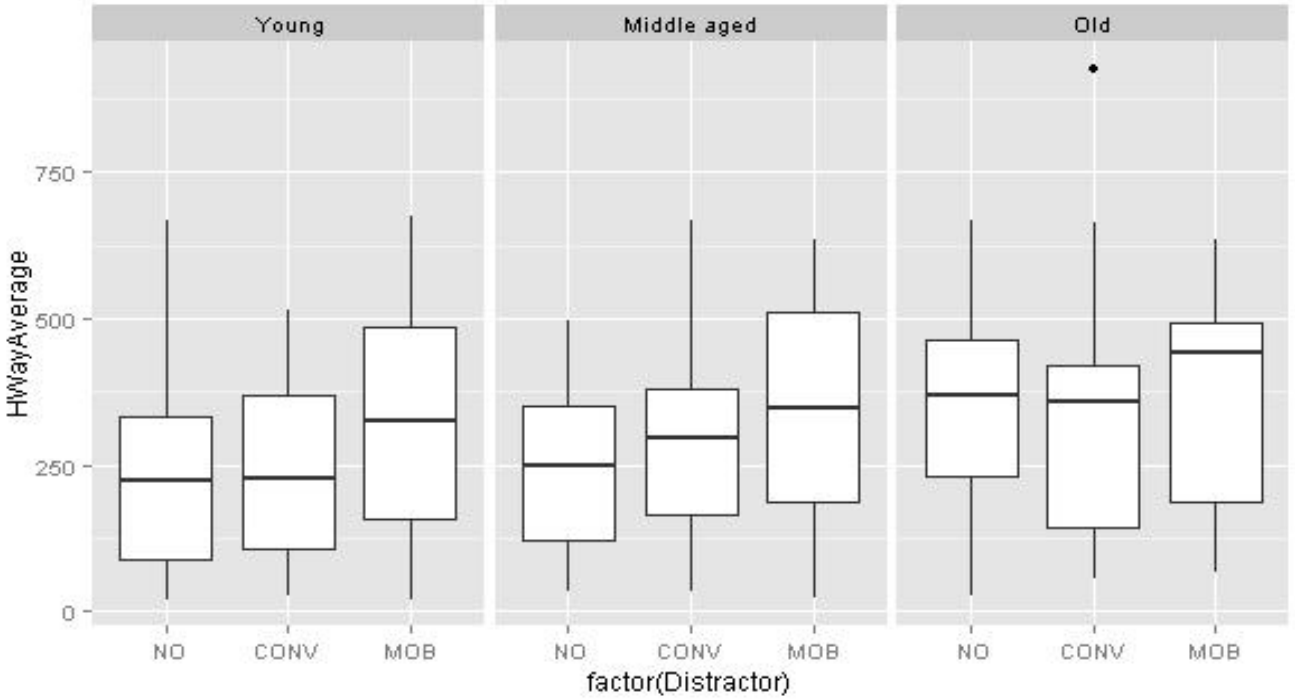
- Older drivers drive in lower speeds regarding young and middle aged drivers
- Drivers of all age groups reduce their speed, especially while talking on the mobile phone
- While conversing with the passenger drivers do not change the mean speed

Standard deviation of lateral position



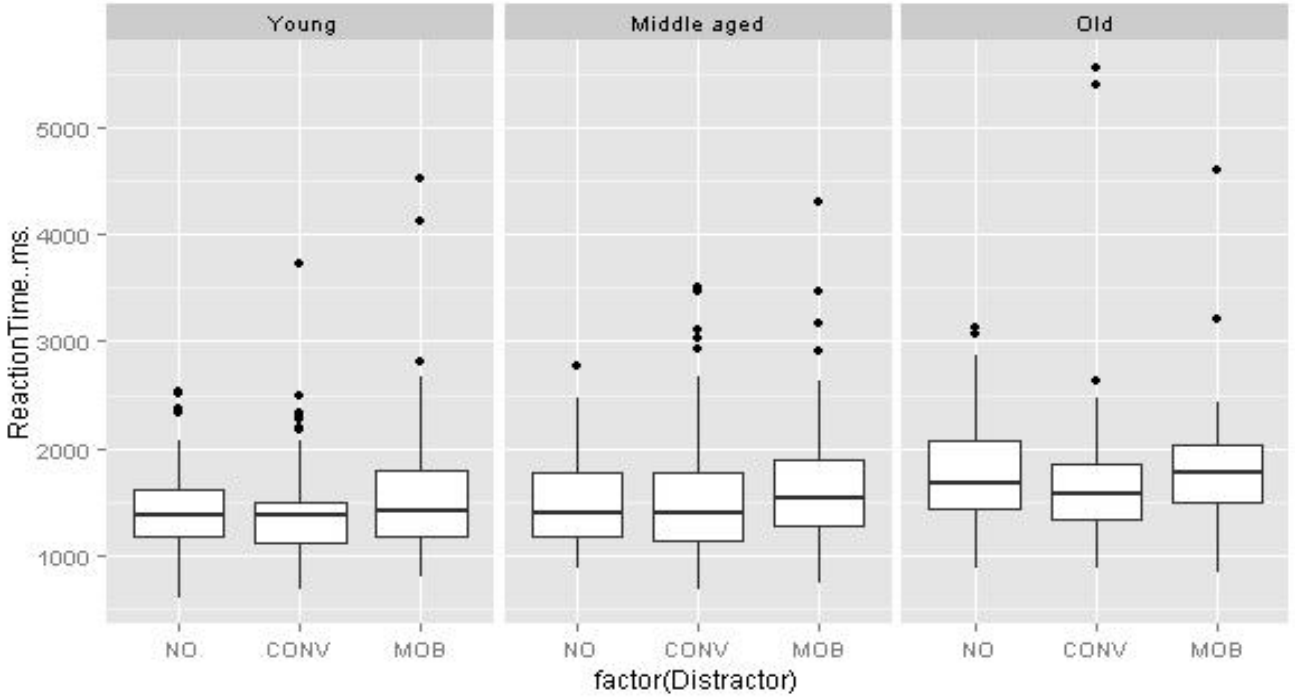
- Young drivers drive more conservatively and are better able to maintain their lateral position
- No big differences in the standard deviation of the lateral position with or without distraction are observed

Mean headway



- While talking on the mobile phone, drivers of all age groups keep much larger headways from the vehicle ahead
- No pattern can be identified between conversing with passenger and driving without any distraction

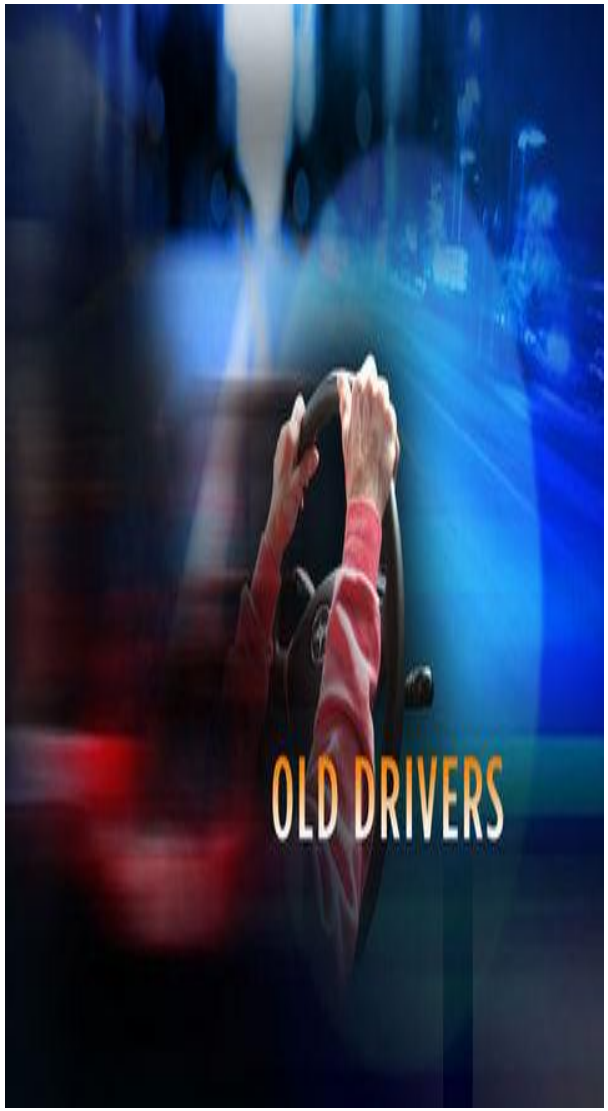
Reaction time



- The worst reaction time while talking on the mobile phone occurs in older drivers
- Young and middle aged drivers achieved the best reaction time without any distraction
- Reaction while conversing with the passenger is similar with undistracted driving

Conclusions (1/2)

- Results suggest that the specific methodology and design confirm the initial hypotheses and may reveal differences between different distraction sources for different age groups
- Older drivers drive in lower speeds compared to young and middle aged drivers
- Drivers of all age groups talking on the mobile phone were found to have difficulty in maintaining the vehicle position on the lane
- Reaction time of the drivers at unexpected incidents exhibited differences between distraction sources



Conclusions (2/2)

- Older drivers are not familiarized with the use of mobile phones and cannot operate calls as young or middle aged drivers
- The physical presence of a hand-held phone acts as a reminder to the driver of the potential safety threat posed by the use of the phone
- Compensatory behaviour can occur at a number of levels ranging from the strategic (e.g. choosing not to use a mobile phone while driving) to the operational level (e.g. reducing speed)

Next steps

- Further statistical analyses should be implemented in order to investigate the effect of age and distraction on driving parameters (e.g. general linear mixed models)
- Compensatory behaviour should be further explained by driving performance parameters especially regarding older drivers
- The effect of all types of mobile phone use (hands-free, Bluetooth, writing messages) should be examined

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