BACKGROUND
Although older drivers are involved in a few accidents in terms of absolute numbers, they represent one of the highest risk categories for accidents involving fatalities and serious injuries per number of drivers and per distance travelled probably because of their great fragility and reduced tolerance to injury. Furthermore, cell phone use is estimated to be an important cause of vehicle accidents. Even if cell phone use can be considered as part of everyday the increased use of cell phones from drivers of all age groups while driving makes the investigation of their influence on driving behaviour and on road safety very essential. In addition, as there are a lot of different methods and measures that exist for evaluating driving performance, the selection of the specific measures for driver distraction research, as in other areas of research, should be guided by a number of general rules related to the nature of the task examined as well as the specific research questions. Within this framework, reaction time measures is an increasingly popular set of variables primary because of the relationship with accident risk.

OBJECTIVE
The objective of this research is the analysis the reaction time of older drivers while talking on the cell phone. For this purpose, a large driving simulator experiment is carried out, in which 95 drivers from three different age groups (young, middle aged and older) were asked to drive under different types of distraction (no distraction, conversation with passenger, cell phone use) in rural and urban road environment, in low and high traffic. In addition, two unexpected events are set in each driving scenario, where the reaction time of each driver is recorded.

EXPERIMENT DESIGN
Sample
The sample of participants is 95 healthy drivers
- 28 young drivers aged 18-34 years old
- 31 middle aged drivers aged 35-54 years old
- 36 older driver aged 55+ years old

Distraction conditions:
- undistracted driving
- driving while conversing with a passenger
- driving while conversing on a cell phone.

Conversation topics
Family, Ongin, Accommodation, Travelling, Geography, Interests, Hobbies, Everyday life, News, Business

EXPERIMENT PROCEDURE
Driving scenarios:
- A rural route that is 2.1 km long, single carriage way and the lane width is 3 m, with zero gradient and mild horizontal curves
- An urban route that is 1.7 km long, at the bigger part dual carriage way, separated by guardrails, and the lane width is 3.5 m

Traffic scenarios:
- Moderate traffic conditions, corresponding to an average traffic volume $Q=300$ vehicles/hour
- High traffic conditions, corresponding to an average traffic volume of $Q=600$ vehicles/hour

Randomisation
A randomization in the order of the area type in which the participant is going to drive, as well as in the order of the traffic and distraction scenarios is taking place.

Familiarization
During the familiarization with the simulator, the participants practiced in:
- handling the simulator (starting, gears, wheel handling etc.)
- keeping the lateral position of the vehicle
- keeping stable speed, appropriate for the road environment
- braking and immobilization of the vehicle

Unexpected incidents
During each trial of the experiment, 2 unexpected incidents were scheduled to occur along the drive:
- incidents in rural area concerned the sudden appearance of an animal
- incidents in urban areas concerned the sudden appearance of an adult pedestrian or of a child chasing a ball on the roadway.

RESULTS
Regarding the effect of driver characteristics on reaction time
- younger drivers have the worst reaction time when talking on the cell phone
- young and middle aged drivers of both genders are characterized by higher reaction times when conversing with a passenger than when talking on the cell phone

CONCLUSIONS
- while talking on the cell phone or conversing with passenger, drivers of all age groups have higher reaction times compared with undistracted driving.
- age has the higher effect on reaction time as older drivers have the worst reaction times compared to young and middle aged drivers
- in urban areas drivers achieve better reaction time than in rural areas probably due to the fact that in urban areas, the complex road environment keeps the drivers alerted
- female drivers, especially in rural areas, were found to have the worst reaction times, while talking on the cell phone

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