



**4th International Conference on
Road Safety and Simulation
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**23rd-25th October 2013
Rome, Italy**

***A Review of Driving Performance Assessment
in Simulators with focus to cognitive impairments
related to age or caused by neurodegenerative disorders***

S. Vardaki, G. Yannis

National Technical University of Athens



S. G. Papageorgiou

National and Kapodistrian University of Athens



Objectives

- To identify and summarize studies that focus on cognitive impairment, particularly age-related or caused by neurodegenerative disorders
 - Mild cognitive impairment (MCI)
 - Alzheimer's disease (AD)
 - Parkinson's disease (PD)
 - Stroke
- To identify issues that should be considered in the design of simulator experiments with potential impact on the research findings and their generalisability.



- **Indicative findings of the reviewed studies**
 - Driving performance of people with PD
 - Driving performance of people with MCI, AD
 - Age-comparisons

- **Methodological issues**
 - Scenario design and driving tasks
 - Relationships between driving tasks and cognitive domains
 - Concerns of the studies
 - Participant adaptation and practice scenarios



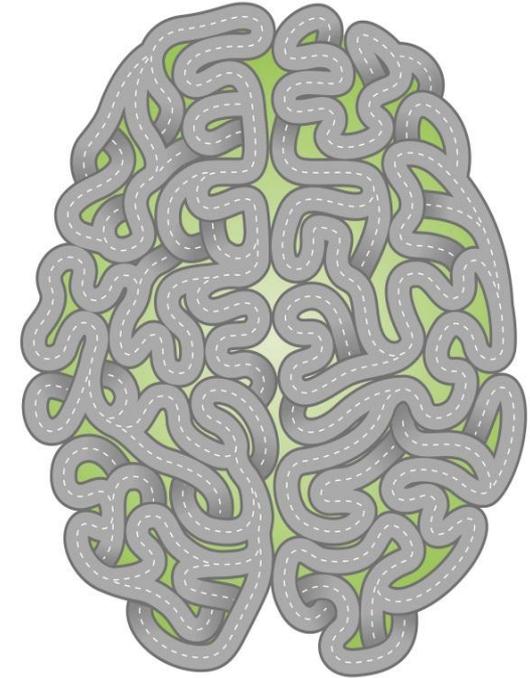
Conclusions

- The studies are summarized on the basis of:
 - the research questions asked
 - the characteristics of the subjects
 - the types of simulators used
 - driving scenarios and tasks used
 - outcome variables (dependent measures)
 - the main findings
 - suggestions for further research.
- Consideration is given to the studies' limitations and the interpretation of the findings in an effort to identify issues with possible implications for research results and their generalisability.



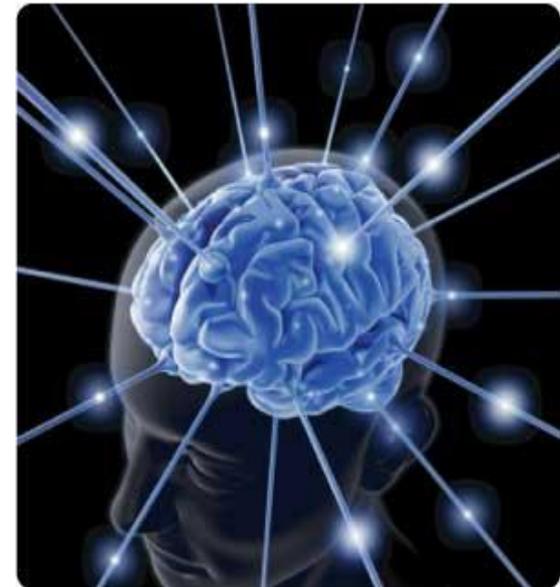
Conclusions (1/2)

- Driving simulators provide the possibility of safe and controlled observation of driver errors of different risk severity in a range of operational and tactical driving tasks in populations of various demographic characteristics with driving impairments due to various diseases or conditions.
- Challenges that researchers commonly face relate to limitations of the simulators, scenario validation and participant adaptation.



Conclusions (2/2)

- A major challenge to researchers when designing an experiment is to choose effective and well defined measures of performance as well as scenarios that allow problems in driving behavior to be manifested and mechanisms of impairment to be identified.
- When driving simulators are used either as a complement to road and neuropsychological testing, or as a tool to understand mechanisms of driving impairment in populations with medical disorders, it is imperative to validate the results before conclusions regarding their generalisability are made.





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