Ageing and Safe Mobility

International interdisciplinary conference

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Older driver's self-assessment and cognitive impairments

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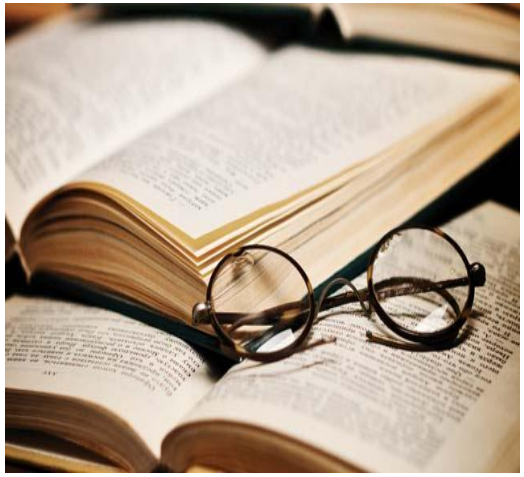
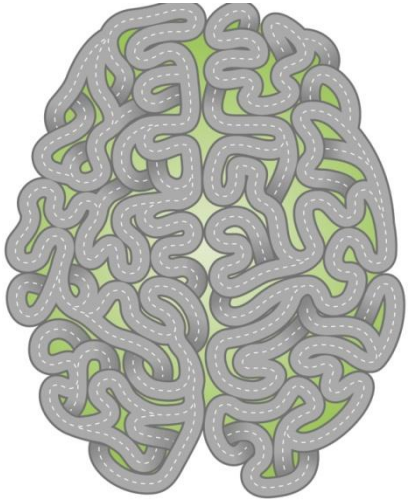
Background

- Older drivers with functional decline **self-regulate their driving** more than older "healthy" drivers.
- **Driving confidence** is a key factor in determining why some older drivers regulate their driving but others do not.
- "Impaired" drivers often think that they possessed good health and driving abilities and are confident in a range of potentially **hazardous situations**.
- Some continue to drive when it is no longer safe, and **exercise poor judgment** about their abilities.
- It is of critical importance to **monitor fitness** of patients with brain pathology from the early stages of the disease.
- It is important to address the aforementioned factors when examining self-awareness of driving abilities in the elderly population, and investigate **how these factors ultimately determine driving behavior on those people**.





Objectives

The aim is to investigate the self-assessment of driving performance between healthy drivers and drivers with cerebral diseases

- Cerebral diseases examined:
  - Mild Cognitive Impairment (MCI)
  - Alzheimer's Disease (AD)
  - Parkinson's Disease (PD)

- Questionnaires:
  - self-evaluation of perceptual motor and safety skills
  - self-assessment of driving skills in comparison to their abilities 5 years ago

Methodology

- Distract and DriverBrain research projects
- The sample for this study consisted of 77 participants :
  - 39 “impaired” participants
  - 38 “healthy” participants
- All the participants should:
  - have a valid driving license
  - drive for more than 3 years
  - have driven more than 2.500km during the last year
  - drive at least once a week during the last year
  - drive at least 10km/week during the last year.

An interdisciplinary research team

- Dpt. of Transportation Planning and Engineering NTUA
- Dpt. of Neurology of the University of Athens (NKUA) Medical School, ATTIKON Hospital, Athens
- Dpt. of Psychology, UoA School of Philosophy, Pedagogy and Psychology

Questionnaire of self-evaluation

- The questions require the self-evaluation of the perceptual-motor and safety skills of the driver.
- The questions of the section are derived from the Driver Skill Inventory (Lajunen & Summala, 1995), with adaptations and modifications by the research team.
- The section employs a 4-point scale (from weak to strong), in order to prevent the bias of responses that cluster in the middle.

Which of the below skills do you think you are weak at and which do you think you are strong at?

	*Fill in with √ the box of your choice	Weak	Slightly weak	Quite strong	Strong
1	To drive long distances	(1)	(2)	(3)	(4)
2	To quickly realize the hazards on the road	(1)	(2)	(3)	(4)
3	To drive in slippery roads	(1)	(2)	(3)	(4)
4	To change lanes comfortably	(1)	(2)	(3)	(4)
5	To take quick decisions when driving	(1)	(2)	(3)	(4)
6	To remain calm in stressful situations when driving	(1)	(2)	(3)	(4)
7	To control your vehicle	(1)	(2)	(3)	(4)
8	To leave enough distance from the front car	(1)	(2)	(3)	(4)
9	To adjust the speed to suit the road conditions	(1)	(2)	(3)	(4)
10	Overtaking, if necessary	(1)	(2)	(3)	(4)
11	To give priority when needed	(1)	(2)	(3)	(4)
12	To obey speed limits	(1)	(2)	(3)	(4)
13	To park your vehicle in reverse gear	(1)	(2)	(3)	(4)
14	To be mindful of the other vehicles in the road	(1)	(2)	(3)	(4)
15	To drive quickly, if necessary	(1)	(2)	(3)	(4)
16	To drive at night	(1)	(2)	(3)	(4)
17	To be mindful at pedestrians and bicyclists	(1)	(2)	(3)	(4)

Questionnaire assessing driving performance

Perceived safe-driving ability in general, as well as in various situations and under various conditions contained in the present questionnaire, were correlated to several variables of driving performance (including compensatory behavior), self assessed performance and feeling of danger during an on-road trial (Vardaki and Karlaftis, 2011).

It includes 18 questions which are scored in a 3-point scale and questions refer to different driving situations (on a highway, at night, in heavy traffic, etc.)

How do you assess your driving behaviour today in comparison with 5 years ago?

*Fill in with √ the box of your choice		significantly worse	slightly worse	no difference
1	Low traffic - Quiet road	(1)	(2)	(3)
2	City with high traffic	(1)	(2)	(3)
3	Highways	(1)	(2)	(3)
4	Motorway	(1)	(2)	(3)
5	Night	(1)	(2)	(3)
6	Heavy rain	(1)	(2)	(3)
7	Driving in slippery roads	(1)	(2)	(3)
8	Winding road	(1)	(2)	(3)
9	Unknown region	(1)	(2)	(3)
10	Lane change	(1)	(2)	(3)
11	Long distances (>2hr)	(1)	(2)	(3)
12	Left turns	(1)	(2)	(3)
13	Driving while being tired	(1)	(2)	(3)
14	Driving alone	(1)	(2)	(3)
15	Conversation with passenger	(1)	(2)	(3)
16	Conversation by mobile phone	(1)	(2)	(3)
17	Intersections without traffic lights	(1)	(2)	(3)
18	Overtaking on rural roads with two lanes	(1)	(2)	(3)

Demographic characteristics

	Healthy Participants (n=38 , Males=19,Females=19)		Impaired Participants (n= 39, Males=28, Females=11)	
	Mean	SD	Mean	SD
Age	43,9	15,6	66,2	10,1
Years of education	14,6	2,8	11,7	4,4

	MCI Participants n=25 (Males=14,Females=11)		AD Participants n=4 (Males)		PD Participants n=10 (Males)	
	Mean	SD	Mean	SD	Mean	SD
Age	66,4	9,7	70,2	11,3	64,2	11,1
Years of education	14,6	2,8	7.2	6,6	12,7	3,7

Results (1/2)

Analyses of covariance of each question of the self-assessment of driving skills questionnaire

	Healthy		Impaired				
	Mean	SD	Mean	SD	*F*	*df*	*p*
To drive long distances	**3,5**	**0,8**	**2,9**	**1,2**	**7,30**	**1**	**0,009**
To quickly realize the hazards on the road	3,5	0,6	3,4	0,7	0,10	1	7,700
To drive in slippery roads	2,9	0,9	2,7	0,9	0,60	1	0,430
To change lanes comfortably	3,6	0,8	3,3	0,8	1,20	1	0,300
To take quick decisions when driving	3,6	0,7	3,6	0,6	0,01	1	0,930
To remain calm in stressful situations when driving	3,4	0,6	3,3	0,9	0,12	1	0,740
To control your vehicle	3,6	0,5	3,5	0,6	0,50	1	0,450
To leave enough distance from the front car	3,5	0,8	3,7	0,6	1,40	1	0,240
To adjust the speed to suit the road conditions	3,8	0,5	3,8	0,5	0,40	1	0,530
Overtaking, if necessary	3,6	0,6	3,5	0,8	1,30	1	0,260
To give priority when needed	3,8	0,5	3,8	0,6	0,24	1	0,620
To obey speed limits	3,5	0,7	3,5	0,8	0,00	1	0,980
To park your vehicle in reverse gear	3,7	0,5	3,5	0,6	3,30	1	0,074
To be mindful of the other vehicles in the road	3,8	0,4	3,7	0,5	0,03	1	0,860
To drive quickly, if necessary	3,5	0,6	3,3	0,6	0,60	1	0,420
To drive at night	**3,6**	**0,6**	**2,7**	**1**	**10,20**	**1**	**0,002**
To be mindful at pedestrians and bicyclists	3,9	0,3	3,8	0,5	0,08	1	0,770

The total score of the questionnaire showed no significant differences, **F(1) = 2.64, p=0.11** between the two groups.

Results (2/2)

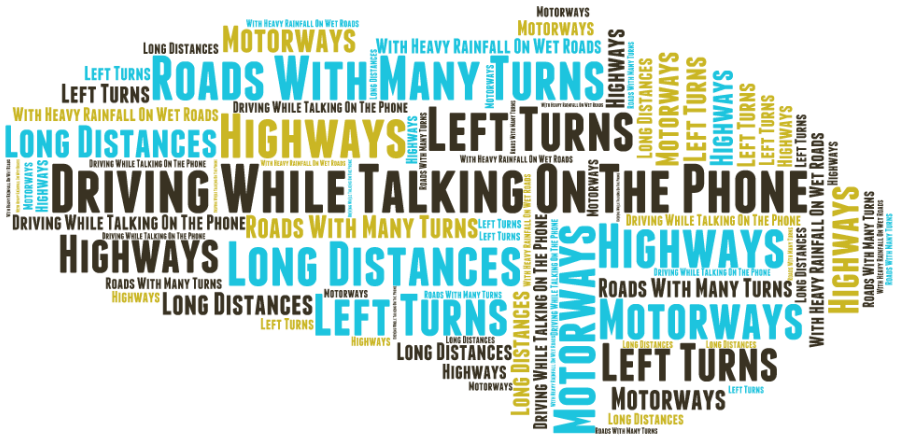
Analyses of covariance of each question of the questionnaire assessing the driving ability decline over the last five years

	Healthy		Impaired				
	Mean	SD	Mean	SD	*F*	*df*	*p*
Low traffic - Quiet road	2,9	0,2	2,8	0,4	0,4	1	0,530
City with high traffic	2,9	0,2	2,7	0,4	3,1	1	0,084
Highways	**2,9**	**0,4**	**2,6**	**0,6**	**6,1**	**1**	**0,017**
Motorway	**2,9**	**0,4**	**2,7**	**0,5**	**4,1**	**1**	**0,046**
Night	2,8	0,4	2,4	0,5	1,9	1	0,160
Heavy rain	**2,8**	**0,3**	**2,4**	**0,5**	**7,8**	**1**	**0,007**
Driving in slippery roads	**2,9**	**0,2**	**2,5**	**0,6**	**7,1**	**1**	**0,010**
Winding road	**2,9**	**0,3**	**2,5**	**0,6**	**6,5**	**1**	**0,013**
Unknown region	2,8	0,3	2,6	0,5	2,2	1	0,140
Lane change	2,9	0,2	2,8	0,5	1,5	1	0,230
Long distances (>2hr)	**2,9**	**0,3**	**2,7**	**0,5**	**5,1**	**1**	**0,027**
Left turns	**2,9**	**0,2**	**2,7**	**0,4**	**7,8**	**1**	**0,007**
Driving while being tired	2,8	0,4	2,3	0,6	3,1	1	0,086
Driving alone	3	0	2,7	0,5	3,8	1	0,054
Conversation with passenger	2,9	0,4	2,6	0,5	1,7	1	0,190
Conversation by mobile phone	**2,9**	**0,2**	**2,5**	**0,7**	**8,2**	**1**	**0,006**
Intersections without traffic lights	2,9	0,2	2,6	0,6	1,5	1	0,220
Overtaking on rural roads with two lanes	2,9	0,2	2,6	0,6	3,6	1	0,064

The total score of the questionnaire showed significant differences, **F(1) = 4.7, p=0.03** between the two groups.

Conclusions

- Impaired drivers **are not aware of having increased difficulties** in their driving skills compared to healthy drivers.
- The only exception derived from the two questions where significant differences were found (**driving long distances and driving at night**), indicated that they recognized some increased difficulties in those conditions.
- Impaired drivers **admit a small impairment** in their driving skills compared to 5 years ago. More specifically in the following questions statistically important differences were found:
  - driving in highways
  - in motorways
  - with heavy rainfall on wet roads
  - on roads with many turns
  - driving for long distances
  - on left turns
  - driving while talking on the phone.



Discussion

- These results could:
  - either indicate that impaired participants are actually not aware of their driving abilities
  - or that they are reluctant of publicly disclosing any particular problems in their driving skills.

- Further research should:
  - include the comparison of the driving patterns of impaired drivers (through a simulator experiment or an on-road test) with their self-evaluation of their driving skills in the particular conditions where they reported perceived difficulties
  - investigate whether in those areas they actually perform worse than other driving conditions.

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