



# Self-awareness of cognitive and driving abilities in patients with Mild Cognitive Impairment, Alzheimer's disease and healthy elderly

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## INTRODUCTION

- Self-awareness is a term used in clinical and non-clinical settings to describe an inherent ability of estimating a particular situation or state in an accurate and objective manner (Prigatano, 2009)
- Self-awareness of cognitive ability has been thoroughly investigated in Alzheimer's Disease (AD) patients concluding that the majority of this population presents signs of impaired self-awareness (SA) linearly correlated to the level of cognitive impairment (Barrett et al., 2005). In patients with Mild Cognitive Impairment (MCI), literature findings have not reached yet a consensus. However, recent findings suggest that impaired SA in MCI patients may be also present and share common neuropathological ground with AD patients (Ries et al., 2007; Fragkiadaki et al., 2016)
- Studies investigating self-assessment of driving abilities suggest that a significant proportion of AD patients restrain their driving early after initial diagnosis. However, patients who continue to drive tend to overestimate their driving abilities, posing a significant risk for public safety (Brown et al., 2005). In patients with MCI, the ability to estimate functional decline seems to be better preserved (Devlin et al., 2012).

## AIM

The aim of the present study was to investigate self-evaluation patterns of cognitive and driving abilities in patients with MCI and AD by comparing self-reported evaluations of performance on a variety of cognitive and driving indexes with direct objective measures of the each specific performance

## METHODS

### Participants:

- 24 healthy elderly drivers (mean age: 61.8±8.1 years, driving experience: 45.8±6.9 years)
- 29 patients with MCI (mean age: 67.5±7.5 years, driving experience: 40.7±5.4 years)
- 16 patients with mild AD (mean age: 73.6±5.1 years, driving experience: 45.8±6.9 years)
- Diagnosis of MCI was made according to the Petersen & Morris, (2005) criteria while the diagnosis of mild AD was based on the criteria suggested by McKhann et al. (2011)

### Procedure:

**Phase A:** Neuropsychological assessment

**Phase B:** Driving simulator assessment at a rural environment without distraction

• After each neuropsychological test and the overall driving simulator experiment, participants were asked to self-evaluate their performance in comparison to other people of their own age and educational level on a scale ranging from -100% to +100

Neuropsychological measures	Driving measures
Clock Drawing Test (CDT)	Average Speed
Hopkins Verbal Learning Test-Revised (HVLT-R)	Headway distance
Brief Visuospatial Memory Test – Revised (BVMT-R)	Lateral position
Judgment of Line Orientation (JLO)	Reaction Time
Trail Making Test A & B (TMT A & B)	Steer Wheel variation
Driving Scenes Test	
Useful Field of View (UFOV)	
Psychomotor Vigilance Test	

Table 1. Neuropsychological and driving measures examined at Phase A and Phase B respectively

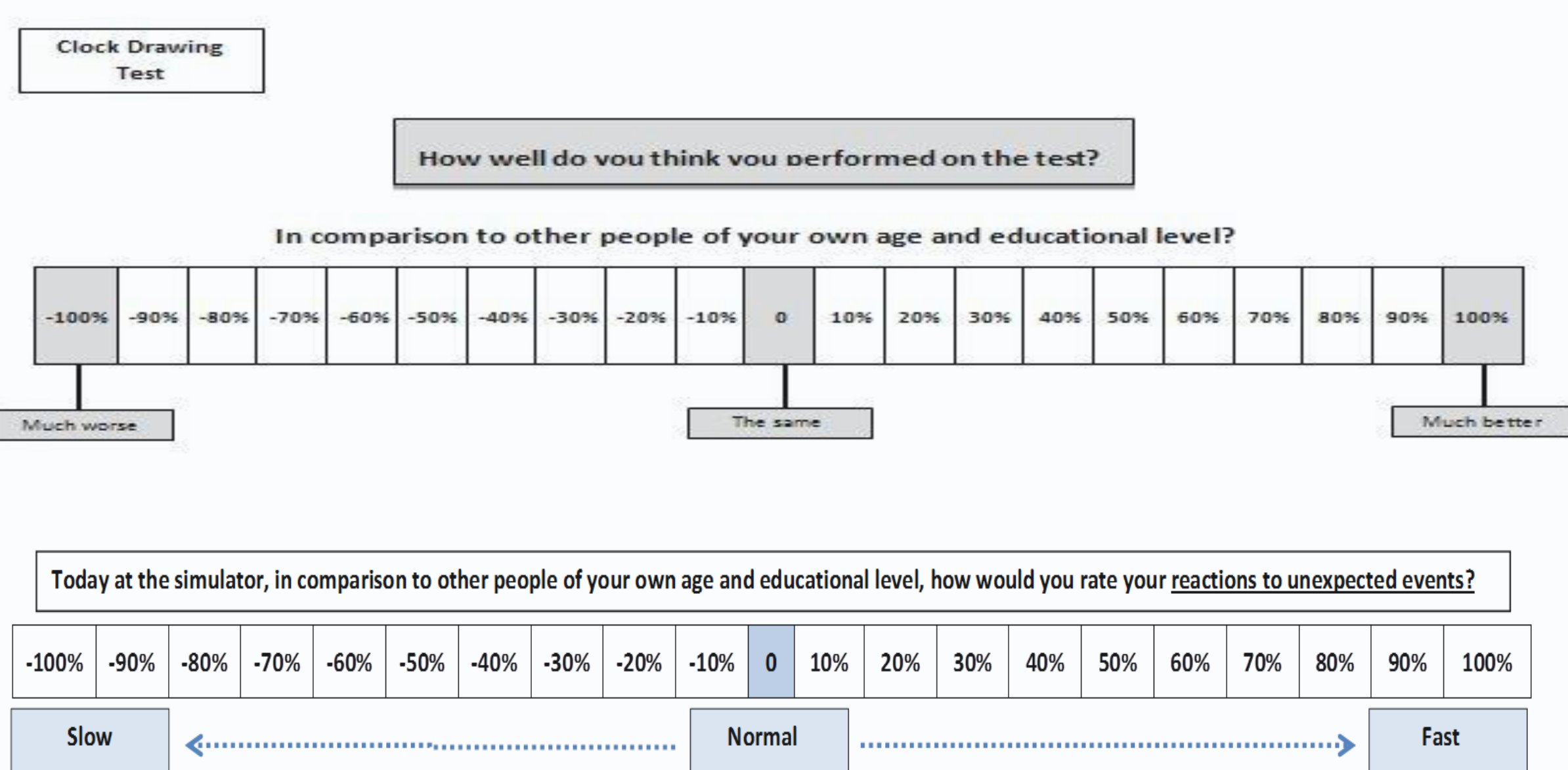


Table 2. Example of the self-assessment scale administered to the participants. The upper scale represents self-evaluation for Phase A while the bottom scale represents self-evaluation for Phase B

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## RESULTS

### COGNITIVE ABILITY

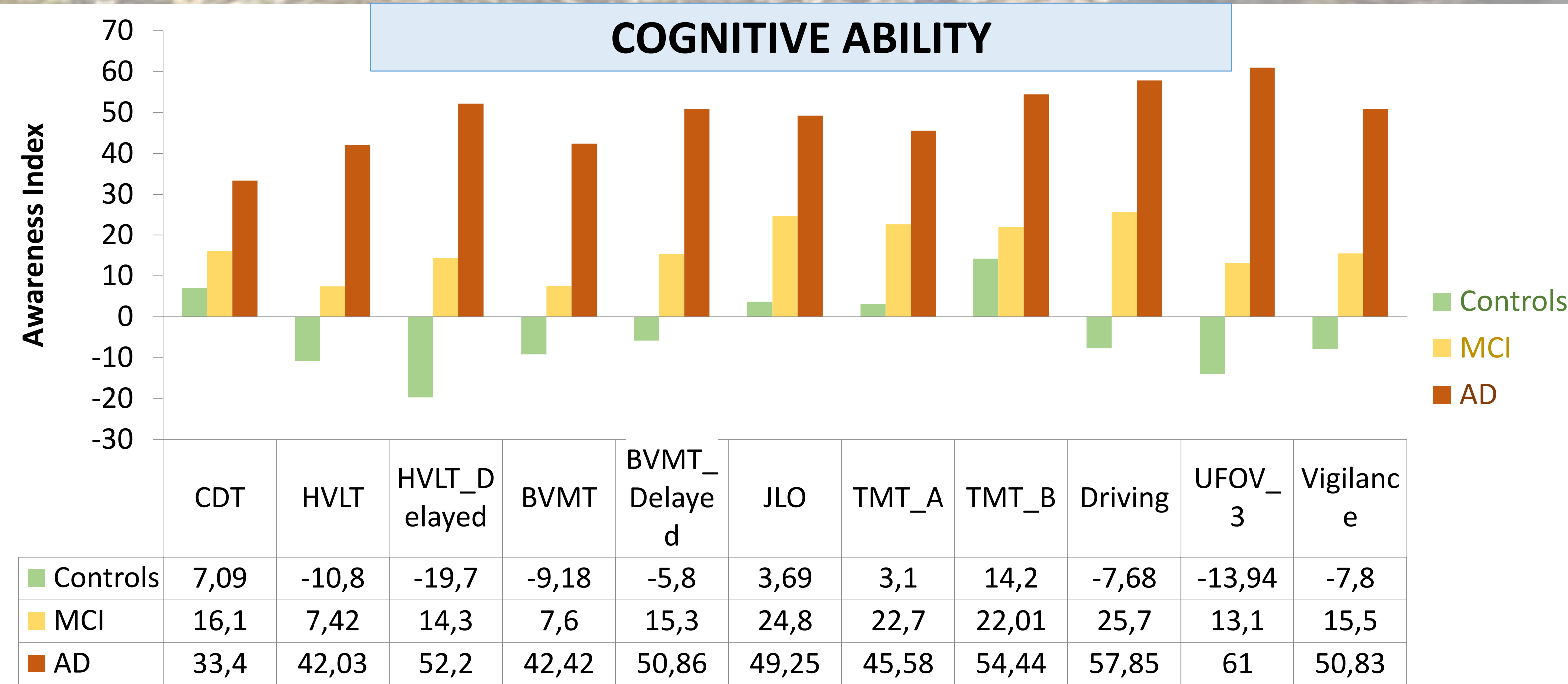


Figure 1. Direction of the level of difference between objective and subjective performance (Awareness Index) among the control group (green bars), the MCI group (light orange bars) and the AD group (red bars). X-axis represents the neuropsychological tests administered and y-axis the awareness index on each test. Bars on the upper side of the line indicate over-evaluation of performance while bars on the lower side indicate under-evaluation of performance

### DRIVING ABILITY

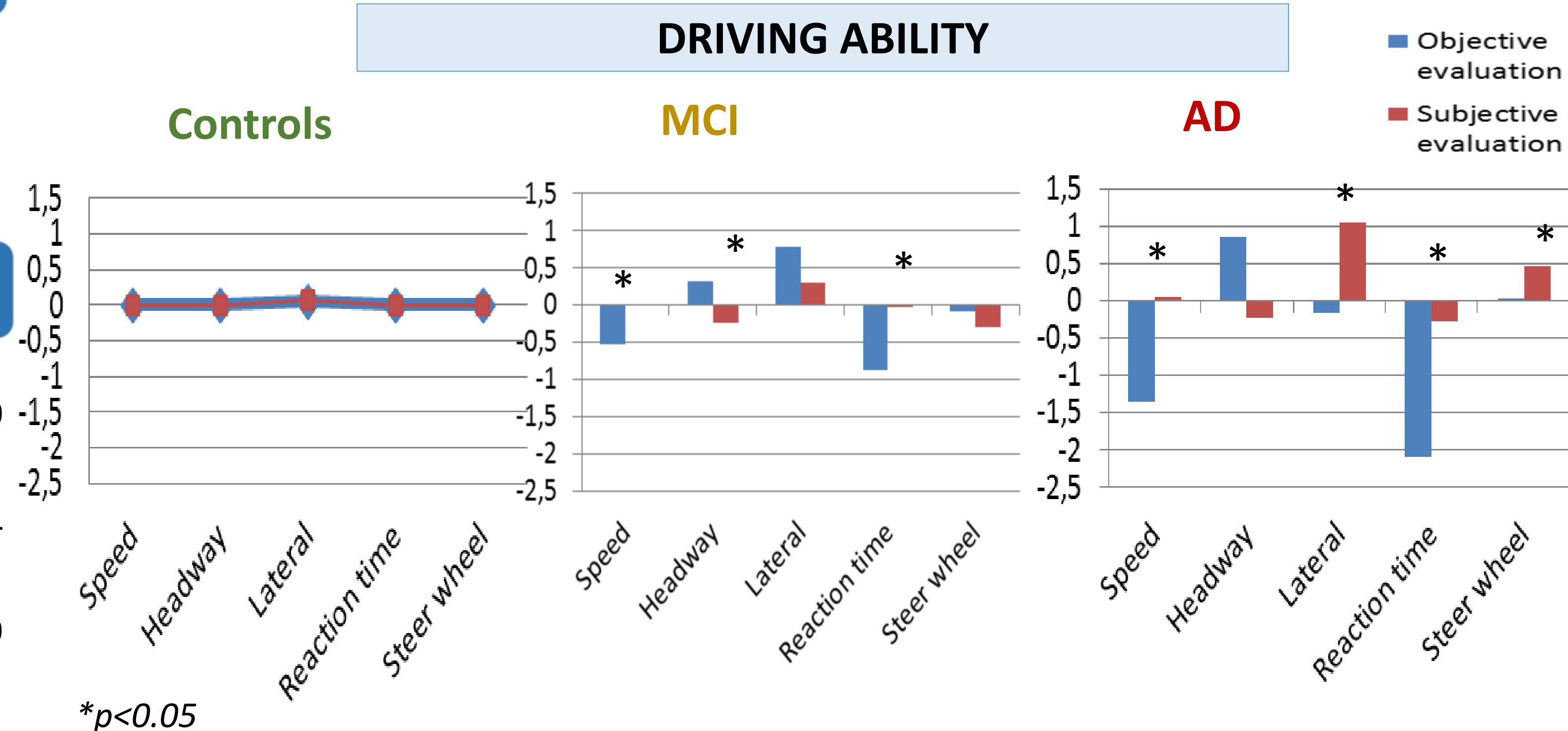


Figure 2. Differences between objective and subjective driving performance in healthy elderly, MCI and AD patients

## CONCLUSION

- Our results indicate that patients with MCI and AD present distorted awareness in their perception of their cognitive and driving abilities
- Those results seem more prominent in the neuropsychological condition, where both MCI and AD groups overestimated their performance in every neuropsychological test examined. The AD group exhibited even worse performance than the MCI group in their ability to self-evaluate their performance
- In the driving condition, MCI patients presented impaired SA in three out of the five driving variables examined while AD patients presented impaired SA in four out of the five driving variables examined. Those results indicate that AD patients present greater impairments when estimating their driving abilities than the MCI group
- Cognitively impaired patients seem to exhibit greater difficulties in evaluating their performance under the unfamiliar and novel situation of a neuropsychological assessment where no cues as regards the optimal performance are available.
- Our findings indicate that a impaired SA is present even at the milder stages of cognitive impairment (MCI). As the level of cognitive decline increases, the ability to estimate performance is further attenuated
- Impaired SA may be a clinical characteristic of AD pathology even at the prodromal (predementia ) stages.

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