



Cognitive and motor reaction times in Obstructive Sleep Apnea Syndrome. A study based on computerized measures

Maria Devita¹, Sonia Montemurro², Martina Argentieri², Grazia Dinoi², Makaj Malvina², Maria Luisa Rusconi¹, Sara Mondini^{2,3}

¹Department of Human and Social Sciences, University of Bergamo, Italy; ²Department of General Psychology, University of Padua, Italy; ³Human Inspired Technology Research Centre, University of Padua, Italy.

Introduction

Obstructive Sleep Apnea syndrome (OSAS) is often reported as mainly associated with executive dysfunction (Gagnon et al., 2014). Although delayed reaction times in patients with OSAS have also been reported (Kilpinen et al., 2014), sensitivity of processing speed has not often been assessed.

The aim of this study is to provide sensitive and reliable measures to clarify whether different components of information processing speed (i.e., cognitive and motor responses) are equally impaired in OSAS.

Participants and methods

Thirty-three patients with OSAS were compared with thirty healthy controls. The MoCA test was administered to assess participants' global neuropsychological profile. Simple (RT S1) and complex (MDT S2) reaction times were assessed. Cognitive (RT S1 COG, MDT S2 COG) and motor (RT S1 MOT, MDT S2 MOT) components were measured by using a detector panel which allows to distinguish between stimulus encoding, decision processing, and selection of the appropriate motor response.

Statistical Analysis

Three logistic regression models were built using **GROUP** (OSAS v. HC) as the **dependent variable**.

In **Model 1**, **MoCA** score was the only regressor;

In **Model 2** **RT/S1 COG** and **MDT/S2 COG**

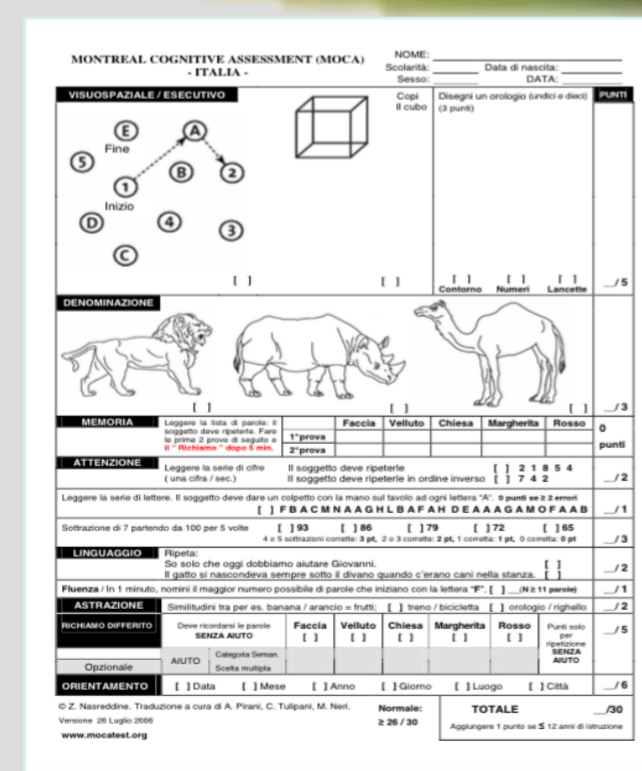
mean cognitive reaction-times were used as regressors;

In **Model 3** **RT/S1 MOT**, **MDT/S2 MOT** mean motor reaction-times were used as regressors.

Results

At the MoCa test patients with OSAS performed significantly worse than controls and significant differences in motor responses were found between the two groups.

| Characteristics (M± DS) | OSAS Patients (n = 33) | Min-Max | Controls (n = 30) | Min-Max |
|-------------------------------|------------------------|------------|-------------------|----------|
| Age | 60,42 ± 13,04 | 31 - 80 | 59,9 ± 13,33 | 30 - 79 |
| Education | 9,63 ± 3,56 | 5 - 17 | 9,7 ± 3,7 | 5 - 18 |
| Cognitive Reserve Index (tot) | 98,54 ± 13,59 | 82 - 124 | 97 ± 13,3 | 74 - 134 |
| Apnea - Hypopnea Index/h | 36,2 ± 16,67 | 8,1 - 74,1 | - | - |



MoCA

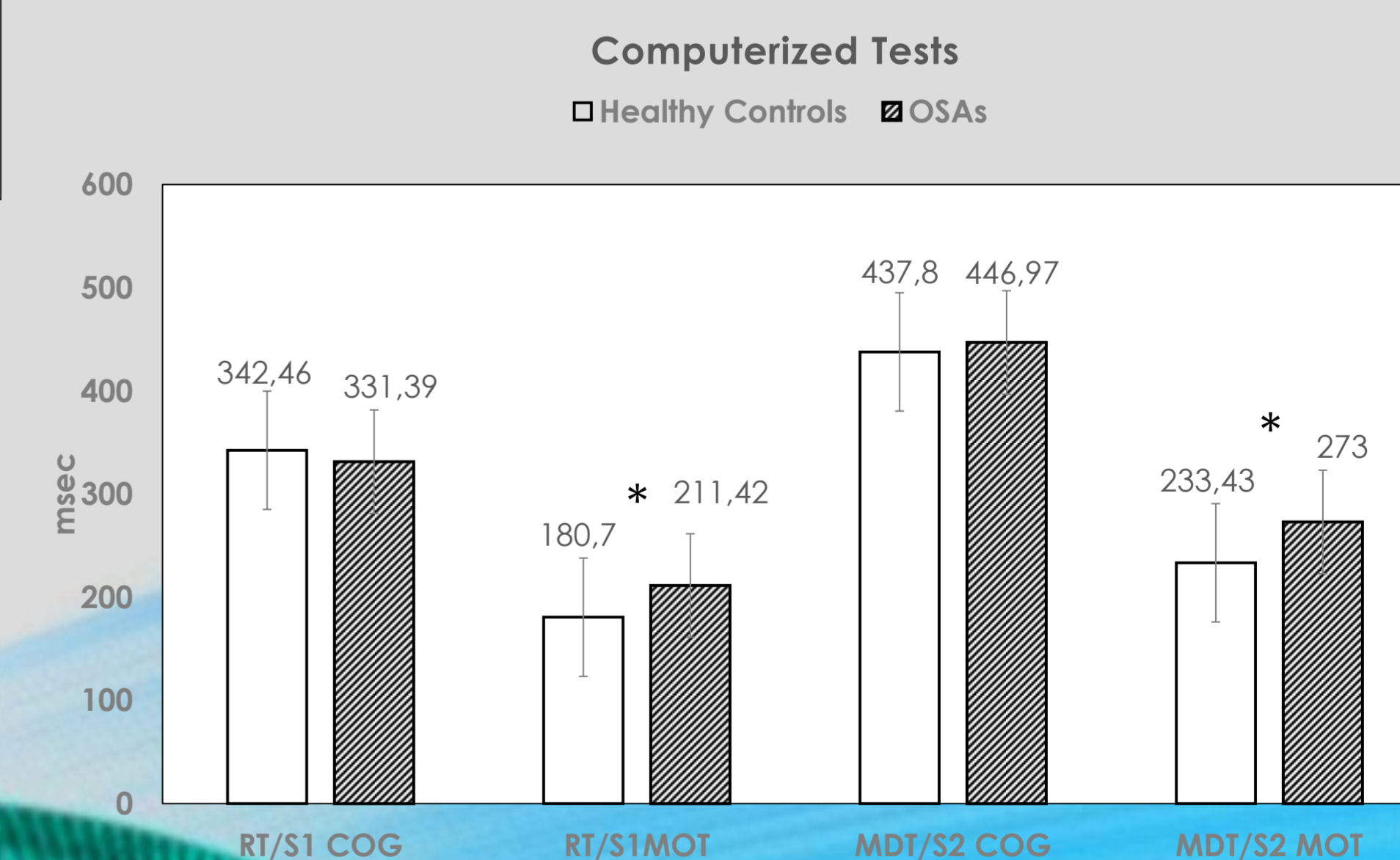


Cognitive Reaction Time



Motor Reaction Time

MoCA



Conclusions

Our study led to two main results:

- 1) a slight decline in the cognitive status of patients with OSAS;
- 2) significant slowing down in the motor component of responses.

A slower motor responsiveness might be the cause of the global cognitive decline of patients with OSAS. A number of studies investigating motor movements and reaction times in aging have showed that these skills are impaired (Myerson, 2007; Mattay et al., 2002). These data suggest that hypoxia might accelerate aging processes by compromising mainly the motor component of reaction times.

References

Kilpinen R et al. Acta Neurol Scand. (2014); Myerson J et al. J Exp Anal Behav. (2007); Mattay VS et al. Neurology (2002)

Acknowledgments:

Thanks to **Andrea Zangrossi** for statistical analysis