



Incidental and intentional memory performance in depression and amnesic mild cognitive impairment

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INTRODUCTION

Intentional memory refers to those situations where individuals are instructed to memorize presented material. It is considered an effortful procedure that engages attentional and executive resources and is believed to be an efficient way of memorizing new information (Vingerhoets, 2005; Karrasch et al., 2010). On the contrary, the encoding of information can be achieved incidentally, without the intention of memorizing. **Incidental memory** refers to situations when the individuals memorize information unintentional, without conscious effort. Incidental memory is believed to be a more prominent function in everyday life (Vingerhoets, 2005).

Only one study (Hart et al., 1987) has examined incidental memory in patients with depression in comparison to patients with Alzheimer Disease (AD). The findings revealed that the patients with AD had a significantly lower performance in incidental memory as compared to the patients with depression.

AIM

The aim of the present study was to investigate incidental and intentional memory performance in patients with depression and amnesic mild cognitive impairment (aMCI). Taking under consideration that depressive patients commonly report similar memory deficits to patients with aMCI, it is very important to find measures which could distinguish these two clinical groups from each other.

METHODS

Participants:

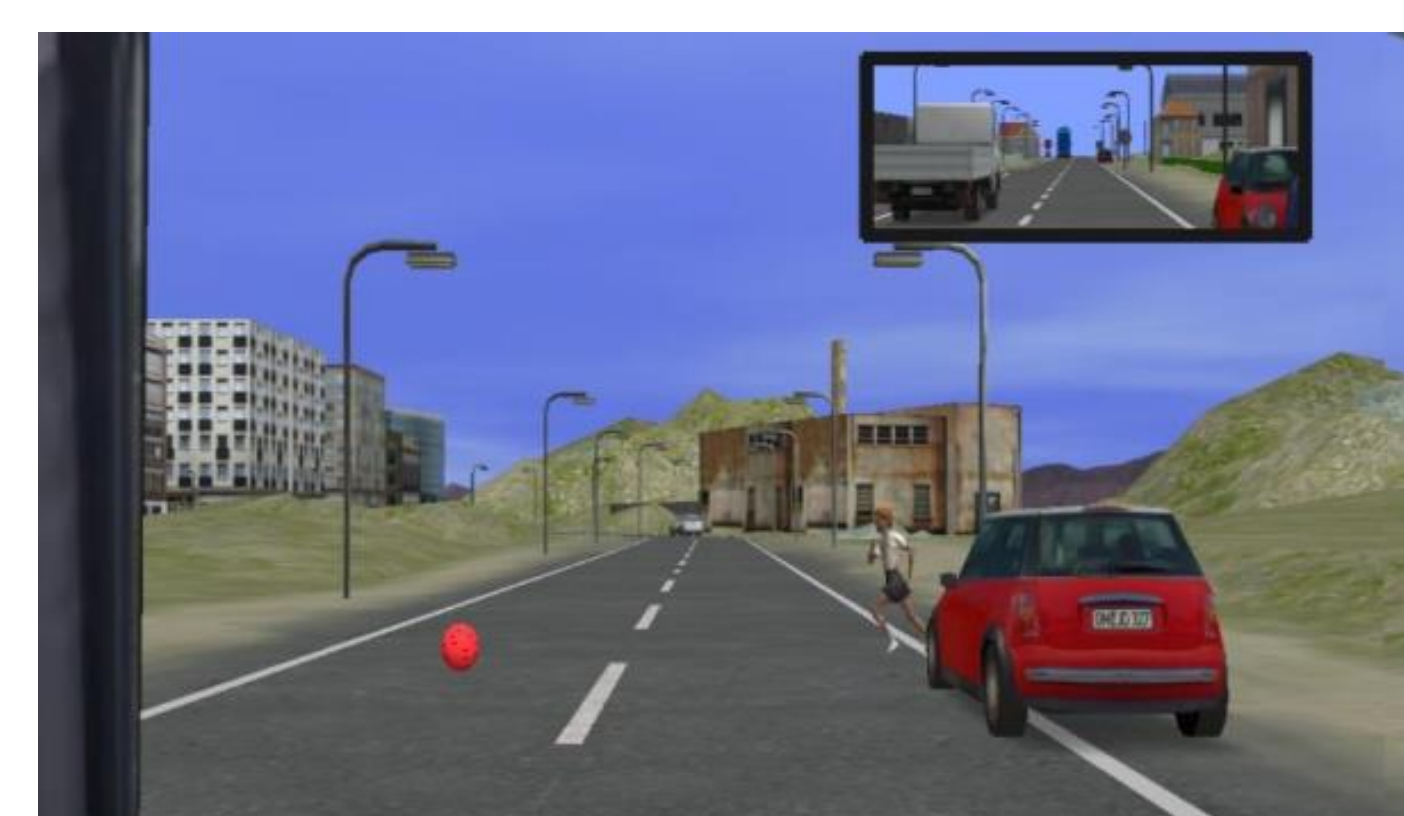
- 12 patients with depression (mean age: 61.1±4.9 years)
- 12 patients with aMCI (mean age: 55.8±11.2 years)
- The diagnosis of aMCI was made according to the **Petersen & Morris, (2005) criteria** while the diagnosis of depression was made according to the **Geriatric Depression Scale (GDS; Yesavage et al., 1983)** and the **Patient Health Questionnaire (PHQ-9; Kroenke, et al., 2001)**
- We considered the presence of depression when a participant had a score greater than six in the GDS scale (Fountoulakis et al., 1999), as well as a score greater than 10 in PHQ9 (Kroenke & Spitzer, 2002).
- **No significant differences were observed in age, educational level between the two groups**

Procedure:

- All the participants underwent a **complete neurological, neuropsychological and ophthalmological assessment** and participated in a **driving simulation experiment**
- Incidental memory was assessed with an **8-item questionnaire**, developed by our research group, including elements from their driving task, without warning (Table 1).
- Intentional memory was assessed by two neuropsychological measures: the **Hopkins Verbal Learning Test (HVLT-R; Benedict et al., 1998)** and the **Brief Visuospatial Memory Test (BVMT-R; Benedict, 1997)** which evaluates verbal and visuospatial memory irrespectively.

Table 1. Incidental Memory Questionnaire

1. What was the speed limit in the rural area?
2. What kind of animal or animals crossed the road in the rural area?
3. How many lanes were in each direction in the rural area?
4. What was the speed limit in the urban area?
5. What was the color of the ball that crossed the road with a child in the urban area?
6. What kind of animal was shown in the sign in the rural area?
7. What was the maximum number of lanes that you met in the urban and rural area?
8. What was in the pond in rural area?



RESULTS

Table 1. Mann-Whitney test for Patients with aMCI & depression in Incidental and Intentional memory performance (in percentage)

Memory tasks	Patients with aMCI		Patients with Depression		Mann-Whitney	
	Mean	SD	Mean	SD	z	p
Incidental recall	60.4	24.3	57.3	24.7	-.18	.859
Incidental recognition	72.9	18.3	77.1	27.6	-1.00	.316
HVLT – Tr1	38.1	8.3	49.9	12.3	-2.58	.01*
HVLT – Tr2	53.4	13.1	68.0	13.7	-2.35	.019*
HVLT – Tr3	63.8	10.8	76.3	15.4	-2.05	.041*
HVLT – DR	33.3	21.6	59.7	24.6	-2.35	.019*
HVLT recognition	81.2	13.4	88.8	10.2	-1.51	.13
BVMT – Tr1	42.3	21.7	51.3	31.1	-.38	.705
BVMT – Tr2	63.8	26.4	73.6	23.3	-.87	.382
BVMT – Tr3	68.0	30.7	81.2	21.9	-1.26	.208
BVMT – DR	68.0	31.5	77.7	25.5	-.82	.413
BVMT recognition	97.1	5.3	98.1	4.5	-.49	.623

Note: HVLT- Tr1= the first learning trial of the Hopkins Verbal Learning Test, HVLT -Tr2= the second learning trial of the Hopkins Verbal Learning Test, HVLT -Tr3= the third learning trial of the Hopkins Verbal Learning Test, HVLT -DR= the delayed recall of the Hopkins Verbal Learning Test, BVMT -Tr1= the first learning trial of the Brief Visuospatial Memory Test, BVMT -Tr2= the second learning trial of the Brief Visuospatial Memory Test, BVMT -Tr3= the third learning trial of the Brief Visuospatial Memory Test, BVMT -DR= the delayed recall of the Brief Visuospatial Memory Test.

* $p < .05$. ** $p < .001$

CONCLUSION

- Our findings demonstrate that patients with aMCI had a **significantly lower performance only in the intentional verbal memory measure**, whereas no significant differences were observed in incidental memory as well as in the intentional visuospatial memory task.
- The advantage of the patients with depression in the intentional verbal memory task could be explained by the nature of the assessment that guides the participants to **allocate their attentional resources on the encoding material**.
- On the other hand, in the case of patients with aMCI their main difficulty is related to their capacity to **learn and consolidate the information**, thus their performance does not improve to the same extent as in the case of patients with depression in the intentional memory task.
- In conclusion, the present findings support the **usefulness of a combined memory assessment** that includes both incidental and intentional encoding, in terms of differentiating patients with depression and patients with aMCI.

REFERENCES/ACKNOWLEDGEMENTS

- Vingerhoets, G., Vermeule, E., & Santens, P. (2005). Impaired intentional content learning but spared incidental retention of contextual information in non-demented patients with Parkinson's disease. *Neuropsychologia*, 43(5), 675-681.
- Karrasch, M., Myllyniemi, A., Latvasalo, L., Söderholm, C., Ellfolk, U., & Laine, M. (2010). The diagnostic accuracy of an incidental memory modification of the Boston Naming Test (memo-BNT) in differentiating between normal aging and mild Alzheimer's disease. *Clin Neuropsychol*. 24(8), 1355-1364.
- Hart, R. P., Kwentus, J. A., Wade, J. B., & Hamer, R. M. (1987). Digit symbol performance in mild dementia and depression. *J Consult Clin Psychol*. 55(2), 236.
- Petersen, R. C., & Morris, J. C. (2005). Mild cognitive impairment as a clinical entity and treatment target. *Arch Neurol*. 62(7), 1160-1163.
- Yesavage, J. A., Brink, T. L., Rose, T. L., Lum, O., Huang, V., Adey, M., & Leirer, V. O. (1983). Development and validation of a geriatric depression screening scale: a preliminary report. *J Psychiat Res*. 17(1), 37-49.
- Kroenke, K., & Spitzer, R. L. (2002). The PHQ-9: a new depression diagnostic and severity measure. *Psychiat ann*. 32(9), 509-515.
- Kroenke, K., Spitzer, R. L. & Williams, J.B. (2001). The Phq-9. *J. Gen. Intern. Med. Discipline*, 16, 606-613. doi: 10.1046/j.1525-1497.2001.016009606.x
- Fountoulakis, K. N., Tsolaki, M., Iacovides, A., Yesavage, J., O'Hara, R., Kazis, A., & Ierodiakonou, C. (1999). The validation of the short form of the Geriatric Depression Scale (GDS) in Greece. *Aging Clin Exp Res*. 11(6), 367-372.
- Benedict, R. H. B. (1997). Brief visuospatial memory test--revised: professional manual. Odessa, FL: Psychological Assessment Resources.
- Benedict, R. H. B., Schretlen, D., Groninger, L., & Brandt, J. (1998). Hopkins Verbal Learning Test-Revised: Normative data and analysis of inter-form and test-retest reliability. *Clin Neuropsychol*. 12, 43-55. doi: 10.1076/clin.12.1.43.1726

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