

Abstract:

- Two associative memory exercises targeting the connection between the left and right brain hemispheres were designed and applied to 15 elderly between 70 to 90 years of age.
- 14 volunteers (2 males) with no cognitive impairment and 1 diagnosed AD volunteer participated in this study during 2 months.
- We hypothesize that regular and frequent exercise of associative memory improves mental state.
- The encouraging results suggest the proposed games could be used as a tool to improve the cognitive state of the older population.

Introduction



Struggling with memory functions represents a source of worry, fear and complaints among the elderly.

- Higher memory problems are present in complex tasks, which includes free and cued recall, source memory and associative memory.
- **Associative Memory** → It occurs with the creation of association links between different items without previous connections and later retrieve these new associations.
- Deficits in memory are related with age and are more pronounced in Alzheimer's disease subjects.
- In this study we investigate the effect of associative memory exercises in older adults.



Brain plasticity

New findings over the last 20 years have shown that our brain is dramatically plastic it can adapt, rewire, heal, renew, and even into old age, not only change its structure but also generate new neurons

Methods

Brain Exercises

- Played by every volunteer three times in a week for 8 consecutive weeks.
- Each game was played two times each session.

1. Word-Image Association

Word Association Score: 0

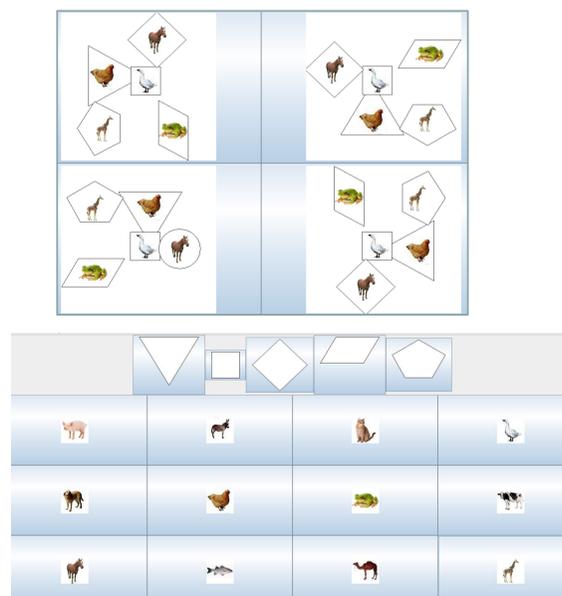
Word Association Score: 0

cookie



Click here if you don't remember a word

2. Associative Memory



Neurocognitive Assessment

- The Montreal Cognitive Assessment (MOCA test) and the Wechsler Memory Scale (WMS III) were employed as an external measurement of the volunteers' memory and mental cognition.
- MOCA test and WMS III were administered before and after the two months of exercise as well as one month afterwards.

DATA ANALYSIS

- For the Word-Image Association game the scores of each session were recorded, the best ones were averaged for all participants (14 cognitively healthy).
- For the Associative Memory game the number of mistakes that the volunteers made in associating the correct shape with the correct animal was recorded.
- Results from WMS before and after the exercise regime were averaged also the pre-exercise and post-exercise WMS results were compared using two side T-test analysis

Results

Word-Image Association game

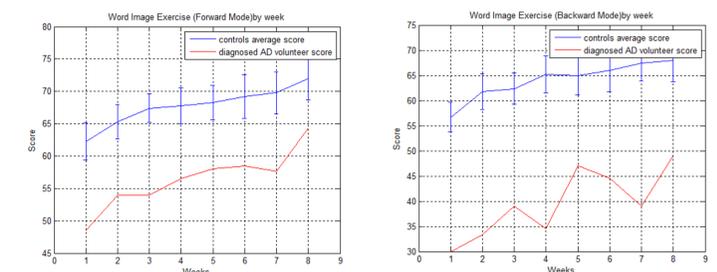


Fig. 1. Control subjects average score (±standard error) and diagnosed AD volunteer score on Word-Image game (forward and backward mode), population=15 subjects (14 controls)

Associative Memory game

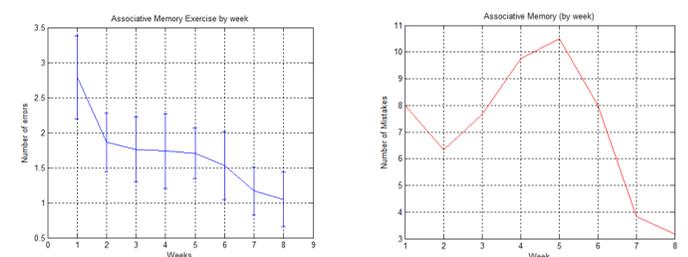


Fig. 2. Average Number of Mistakes (±standard error) on Associative Memory game, population= 14 control subjects

Fig. 3. Average Number of Mistakes on Associative Memory game, population= 1 diagnosed AD

Wechsler Memory Scale

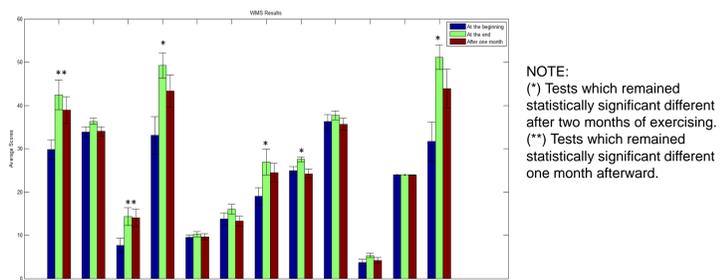


Fig. 4. WMS average scores (at the beginning, at the end of the exercising regime, and one month afterwards), population = 14 control subjects

TABLE 1

| Subtest Name | Total Raw Scores | At the beginning | At the end | After one month |
|------------------------------------|------------------|------------------|------------|-----------------|
| Logical Memory I | 0 | 7 | 5 | |
| Faces I | 34 | 31 | 30 | |
| Verbal Paired Associates I | 0 | 0 | 0 | |
| Family Pictures I | 9 | 6 | 5 | |
| Letter- Number Sequencing | 5 | 5 | 0 | |
| Spatial Span | 13 | 13 | 7 | |
| Logical Memory II | 0 | 0 | 0 | |
| Logical Memory II/ Recognition | 15 | 20 | 0 | |
| Faces II | 33 | 30 | 24 | |
| Verbal Paired Associates II | 0 | 0 | 0 | |
| Verbal Paired Associates II/Recog. | 13 | 16 | 1 | |
| Family Pictures II | 4 | 11 | 0 | |

Fig. 5. WMS scores (at the beginning, at the end of the exercising regime, and one month afterwards), population = 1 diagnosed AD volunteer

Conclusions

- Overall the current results are encouraging and suggest that the designed computer games could be used as a tool to help improve mental cognition in the elderly population. Therefore the frequent use of the proposed memory exercises regularly may help in delaying the onset of Mild Cognitive impairment or dementia.

Some Related Publications

- Garcia M.T. et al, The Effect of Associative Memory Exercises in Older Adults, Elsevier Procedia Social and Behavioural Sciences, 2012 (in publication process).
- Luo, L., & Fergus, C. (2008). Aging and Memory: A Cognitive Approach. Canadian Journal of Psychiatry, 53(6):346-353.
- Kesler, S., Lacayo, N., & Jo, B. (2011). A pilot study on an online cognitive rehabilitation program for executive function skills in children with cancer-related brain injury. Journal of Brain Injury, 25(1):101-112

Acknowledgments

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