ORIGINAL ARTICLE

The Rey Auditory-Verbal Learning Test: applicability for the Brazilian elderly population

Teste de aprendizagem auditivo-verbal de Rey: aplicabilidade na população idosa brasileira

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Abstract

***Objective**: The Rey Auditory-Verbal Learning Test is a widely recognized test in neuropsychological literature to evaluate learning and memory. This paper presents the performance of six age groups of Brazilian elderly on the Rey Auditory-Verbal Learning Test. **Method**: A version of the test was developed with a list of high-frequency one-syllable and two-syllable concrete Portuguese substantives. Two hundred and twenty-three subjects of both genders were allocated to 6 age groups (60-64, 65-69; 70-74; 75-79; 80-84 and 85-89 years old) and tested with the Rey Auditory-Verbal Learning Test. **Results**: Educational level and age had a positive and a negative correlation, respectively, with performance on the Rey Auditory-Verbal Learning Test. Women performed significantly better than men. Our results were similar to those found for the Rey Auditory-Verbal Learning Test English version, across similar age ranges. **Conclusion**: Our results suggest that the Brazilian Portuguese Rey Auditory-Verbal Learning Test adaptation was adequate and applicable for evaluating the memory capacity of Brazilian subjects, across similar age and educational levels.*

***Descriptors**: Memory; Aging; Auditory perception; Learning; Neuropsychological tests*

Resumo

***Objetivo**: O teste de aprendizagem auditivo-verbal de Rey é um teste mundialmente reconhecido na literatura neuropsicológica que avalia aprendizagem e memória. Este trabalho apresenta a performance de seis grupos de idosos brasileiros (agrupados em faixas etárias distintas) no teste de aprendizagem auditivo-verbal de Rey. **Método**: A versão utilizada do teste foi desenvolvida com uma lista de substantivos concretos com uma ou duas sílabas muito freqüentes na língua portuguesa falada no Brasil. Duzentos e vinte e três sujeitos de ambos os sexos foram alocados em seis grupos de acordo com a idade (60-64, 65-69; 70-74; 75-79; 80-84 e 85-89 anos) e submetidos ao teste de aprendizagem auditivo-verbal de Rey. **Resultados**: O nível educacional e a idade tiveram correlação positiva e negativa, respectivamente, com a performance no teste de aprendizagem auditivo-verbal de Rey. Mulheres desempenharam o teste significativamente melhor que os homens. Nossos resultados são semelhantes aos encontrados na versão inglesa do teste de aprendizagem auditivo-verbal de Rey para sujeitos com idade semelhante. **Conclusão**: Nossos resultados sugerem que a adaptação brasileira do teste de aprendizagem auditivo-verbal de Rey é adequada e aplicável para avaliação da memória em sujeitos brasileiros de mesma idade e nível educacional.*

***Descritores**: Memória; Envelhecimento; Percepção auditiva; Aprendizagem; Testes neuropsicológicos*

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Introduction

The Rey Auditory-Verbal Learning Test (RAVLT) measures recent memory, verbal learning, susceptibility to (proactive and retroactive) interference, retention of information after a certain period of time during which other activities are performed and recognition memory. It is a fast and straightforward test to administer, and its use has been widely recognized by neuropsychological literature. It was originally developed by Rey[1] and later translated and adapted by authors from several countries. This test has been extensively used with proven efficiency. It is sensitive to deficiencies of memory found in many groups of patients, being useful for the diagnosis of memory disturbances.[2,3] Moreover, the RAVLT has also been useful to identify cases of simulation of memory problems.[4]

In English-speaking countries, there are several studies providing parameters for the interpretation of results from this test.[5-10] In Brazil, normative standards for the test have been developed for the 16-to-89 year-old age bracket.[11] The cited study, however, adopted a translation of the list of words used in English-speaking countries, regardless of the frequency of these words in Portuguese (the language spoken in Brazil) or the number of syllables in each word on the list. The present study aimed to develop a list of high-frequency one-syllable and two-syllable concrete Portuguese substantives[12] and verify the performance of local senior citizens aged between 60 and 89 years divided into six different age groups, on this version of the RAVLT. The rationale for including words of high frequency in the language was that the test would be used to evaluate individuals from different social groups and educational levels.

Method

1. Participants

Two hundred sixty-two individuals aged between 60 and 89 years, of both genders, were evaluated. These individuals had been recruited by the use of local advertisements at six social clubs for elderly people. All the subjects lived within communities in their own homes. These citizens were placed into six age groups, according to the following age brackets: 60-64 years, 65-69 years; 70-74 years; 75-79 years; 80-84 years and 85-89 years. All subjects took part in the test as volunteers and, after having been duly informed about the procedure and having agreed to its conditions, signed a consent form.

The participants in the sample did not present any description of psychiatric or neurological disturbances and had not been on any psychotropic medications for at least the last three weeks. The Brazilian version of the Mini Mental State Exam (MMSE),[13] as well as a version of the Clock Drawing Test,[3] were used in order to trace pathological cognitive decline. The Brazilian adaptation of the General Depressive Scale (GDS-15)[14] was used to evaluate symptoms of depression.

The following criteria were established as conditions for inclusion of participants in the sample:

1) To score more than seven points on the Drawing of the Clock test (maximum score of 10 points according to the criterion adopted by Spreen & Strauss in 1998);

2) To score up to the cutoff point on the MMSE (maximum score of 30 points), according to age and years of schooling for Brazilian individuals;

3) To score less than six points on the GDS-15;

4) To have attended at least four years at an educational institution.

According to their educational level, individuals were classified in three different groups: elementary or primary school, completers or non-completers (from four to eight years of schooling – n = 121), secondary school, completers or non-completers (from nine to eleven years of schooling – n = 70) and university, completers or non-completers (from twelve to eighteen years of schooling – n = 32).

Of the initial sample, fifteen subjects were excluded due to the presence of depressive symptoms; eleven for scores below the cutoff point on the MMSE, and thirteen for score below the cutoff point on the Clock Drawing test. Our final research sample comprised two hundred twenty- three normal subjects.

Table 1 presents mean scores by age groups in the tests used as inclusion criteria in the study.

2. Procedure

1) Description of the test

In the RAVLT, a list of 15 substantives (list A) is read aloud to the subject five consecutive times. Each of the attempts is followed by a test of spontaneous retrieval. After the fifth attempt, a list of interference, also comprising 15 substantives (list B) is read to the subject, followed by its retrieval (attempt B1). After attempt B1, the examiner asks the individual to recall the words from list A, without reading it again (attempt A6). In order to evaluate the learning curve of the words during attempts A1 to A5, the rate of learning during the attempts – LOT[15] was employed, calculated with the following formula: total sum of A1 to A5 - (5 x A1).

After a 20-minute interval, the examiner asks the individual to remember the words from list A (attempt A7) without reading this list. After attempt A7, the individual is submitted to a test of memory recognition, in which a list comprising the 15 words from list A, the 15 words from list B, as well as 20 distracting words (similar to the words in list A and B in phonological or semantic terms) is read to the individual. Upon each word read aloud, the individual is asked to indicate if it belongs to list A, or not. The total time for application of the RAVLT ranges from 35 to 40 minutes.

The total sum of attempts, from 01 to 05, and the rates of proactive interference (B1/A1), retroactive interference (A6/A5) and forgetting speed (A7/A6) are also calculated. The result of the memory recognition test is calculated by adding the correct answers (when the individual correctly identifies that the word belongs/does not belong to list A) - 35 (total of distracting words). This same procedure, used in recognition memory tests, such as those of the Brazilian version of CERAD,[16] allows us to evaluate not only identification of targets (words in list A), but also takes into account the effect of false positives (identification of distracting words) and false negatives (unidentified words in list A).

3. Devising of word lists

The choice of words to compose lists A, B and recognition memory was made by listing words that presented no more than two syllables. All of these had to be very frequently used in brazilian Portuguese. In choosing the words, the study by Pinheiro[12] was consulted. This study was based on the frequency of words present in Brazilian school books. The decision to choose words of high frequency in the language was based on the fact that the test will be used to evaluate individuals from different social groups. Therefore, this choice can facilitate access to the semantic content of each word on the list. Moreover, the normative data of the test are to be used in children over 6 years' old, thereby justifying the use

Table 1 - Characterization of the sample according to inclusion criteria

	Total		Male		Female	
	Mean	Sd	Mean	Sd	Mean	Sd
60-64 years	(n = 57)		(n = 29)		(n = 27)	
Mean age	62.4	1.2	62.3	1.3	62.4	1.2
Mean number of years of formal education	9.3	3.6	9.7	3.6	8.9	3.6
Mean MMSE score	29.3	0.8	29.2	0.8	29.5	0.7
Mean Clock design score	9.5	0.8	9.6	0.3	9.3	0.3
Mean GDS score	1.9	1.8	1.7	1.2	2.1	2.2
65-69 years	(n = 50)		(n = 28)		(n = 22)	
Mean age	67.0	1.3	66.9	1.3	67	1.4
Mean number of years of formal education	9.7	3.9	9.6	3.8	9.7	4.0
Mean MMSE score	29.1	1.1	29.0	1.2	29.1	1.1
Mean clock design score	8.6	1.3	8.6	1.4	8.4	1.6
Mean GDS score	1.8	1.1	1.4	1.2	1.4	1.6
70-74 years	(n = 42)		(n = 22)		(n = 20)	
Mean age	71.9	1.0	71.8	0.8	71.9	1.2
Mean number of years of formal education	10.3	3.4	9.6	2.2	11.0	4.3
Mean MMSE score	27.8	0.9	27.7	0.8	28.0	1.1
Mean Clock design score	8.2	0.8	8.3	1.0	9	1.6
Mean GDS score	2.6	1.5	3.1	1.3	2.1	1.5
75-79 years	(n = 32)		(n = 15)		(n = 17)	
Mean age	76.9	1.1	76.7	0.7	77.1	1.3
Mean number of years of formal education	9.2	2.0	10.0	1.5	8.4	2.2
Mean MMSE score	26.8	0.8	26.5	0.5	27.1	0.9
Mean Clock design score	8.6	1.4	8.3	1.2	8.8	1.7
Mean GDS score	4.2	0.7	4.0	0.7	3.8	0.4
80-84 years	(n = 20)		(n = 9)		(n = 11)	
Mean age	82.4	1.4	82.4	1.4	82.4	1.6
Mean number of years of formal education	7.0	2.9	7.6	3.3	6.2	2.1
Mean MMSE score	25.6	0.9	25.9	0.9	25.2	0.7
Mean Clock design score	8.1	0.8	8.3	1.1	7.9	0.6
Mean GDS score	5.2	1.0	5.0	0.4	5.3	0.7
85-89 years	(n = 23)		(n = 8)		(n = 15)	
Mean age	87.1	1.5	87.3	1.6	87.0	1.5
Mean number of years of formal education	7.7	2.7	9.4	2.9	6.9	2.2
Mean MMSE score	25.4	1.6	25.3	1.4	25.5	1.7
Mean Clock design score	8.1	0.6	7.9	0.8	8.3	0.7
Mean GDS score	5.3	0.6	5.3	0.7	5.4	0.5

of words of high frequency in the language, easily understood by individuals across various age groups.

4. Statistical analysis

A descriptive statistical analysis was accomplished for each measure on each instrument, after calculating the respective mean and standard deviations. For each item in RAVLT, we performed a Multivariate Analyses of Variance (MANOVA) using gender, age group (60-64, 65-69; 70-74; 75-79; 80-84 and 85-89 years of age) and educational level (primary school, secondary school or university) as factors and measures of RALVT as dependent variables. The correlation between educational level and each test measure was checked using Pearson's correlation coefficient. A value of $p < 0.05$ was considered statistically significant for all tests. The Chronbach's α coefficient was calculated to verify the instrument's internal consistency, being a result between 0.8 and 0.95 considered reliable.[15]

5. Approval by Ethics Committee

This study was submitted to, and approved by, the Research Ethics Committee of Hospital Felício Rocho, State of Minas Gerais, Brazil (CEP/FR 129/05). All the participants have signed a consent form in which they declared themselves informed on the purposes of the study. All human and/or animal data included in this manuscript were obtained in compliance with regulations of the Universidade FUMEC.

Results

Chronbach's α coefficient for measures of A1 to A7, B1, LOT, proactive interference, retroactive interference, forgetting speed and memory of recognition was equivalent to 0.85.

The analysis of the age-group factor showed significant differences in all RAVLT measures, except for proactive interference [$F = 0.758$ ($p = 0.581$)]. Such differences were as follow: A1 [$F = 8.616$ ($p < 0.001$)]; A2 [$F = 17.354$ ($p < 0.001$)]; A3 [$F = 28.029$ ($p < 0.001$)]; A4 [$F = 27.730$ ($p < 0.001$)]; A5 [$F = 10.366$ ($p < 0.001$)], total sum from A1 to A5 [$F = 27.109$ ($p < 0.001$)]; A6 [$F = 14.683$ ($p < 0.001$)]; B1 [$F = 7.870$ ($p < 0.001$)]; A7 [$F = 17.809$ ($p < 0.001$)]; recognition [$F = 20.572$ ($p < 0.001$)]; learning during the attempts [$F = 7.535$ ($p < 0.001$)]; retroactive interference [$F = 5.396$ ($p < 0.001$)] and forgetting speed [$F = 3.754$ ($p = 0.003$)].

Bonferroni *post-hoc* analysis did not reveal significant differences between performances of the 60-64 and 65-69 age groups in each of the RAVLT measures, as well as no differences between individuals aged 75-79, 80-84 and 85-89, except for rate of retroactive interference, in which individuals aged 80-84 were significantly superior to those aged 85-89.

The analysis of the educational-level factor showed significant differences in A1 [$F = 19.038$ ($p < 0.001$)], A2 [$F = 14.848$ ($p < 0.000$)], A3 [$F = 23.362$ ($p < 0.000$)], A4 [$F = 17.680$ ($p < 0.000$)], A5 [$F = 10.977$ ($p < 0.000$)], B1 [$F = 4.886$ ($p = 0.008$)], A6 [$F = 13.824$ ($p < 0.001$)], A7 [$F = 12.609$ ($p < 0.001$)], and in recognition [$F = 6.885$ ($p = 0.001$)].

The *post-hoc* analysis of Bonferroni revealed that individuals with primary schooling had worse performances than those with secondary level of education and also that this group went worse than the university group concerning the measures from A1 to A7. In B1 and recognition memory, only the primary school group went worse than the university group.

Comparisons between the performance of men and women across all age groups demonstrated that men's performance was significantly inferior in measures A1 [$F = 9.062$ ($p = 0.003$)], A3 [$F = 4.666$ ($p = 0.032$)], A5 [$F = 4.303$ ($p = 0.39$)] and in total sum from A1 to A5 [$F = 4.701$ ($p = 0.031$)].

There is no interaction between gender x age group and gender x educational level. We found interaction between age group and educational level only in proactive interference [F = 2,317 (p = 0.021)], B1 [F = 3.509 (p = 0.001)] and A7 [F = 3.050 (p = 0.003)].

The variable concerning the level of education (in years of school attendance) presented a significant correlation with the measures A1 (r = 0.360 and p < 0.001); A2 (r = 0.302 and p < 0.001); A3 (r = 0.336 and p < 0.001); A4 (r = 0.309 and p < 0.001); A5 (r = 0.258 and p < 0.001); B1 (r = 0.169 and p = 0.012); with the total sum of A1 to A5 (r = 0.372 and p < 0.001); A6 (r = 0.238 and p < 0.001) and A7 (r = 0.255 and p < 0.001). The study found no correlation between level of education and total measures of recognition, proactive interference, retroactive interference or forgetting speed.

The results for the different age groups, according to gender and age, are described in Table 2. The Learning curve for different age groups is presented in Figure 1.

Discussion and conclusions

The objective of the present study was to obtain reliable parameters for the application of the RAVLT, and to analyze its results for local elderly aged 60 to 89 years. The analysis of social-demographic variables showed the importance of considering age, gender and educational level of the individual in analyzing results.

Since subjects with university level performed better than those from secondary and primary schools in all measures from A1 to A7 and better than the primary school group in B1 and recognition memory, educational level seems to have a huge impact on the RAVLT performance.

Also, the educational level presented a positive correlation with performance on the RAVLT. This result is compatible with several earlier studies,[8,17,18] but does not corroborate the findings of Mitrushina et al.[10] The difference between our study and that conducted by Mitrushina et al. could be attributable to the characteristics of the sample, since these authors had evaluated individuals with a high intellectual and educational level, while our sample presented high heterogeneity for educational level. The lack of effect of the educational level on RAVLT performance has also been demonstrated in other studies, such as those by Wiens, McMinn & Crossen,[7] and Bolla-Wilson & Bleecker.[19] These authors have suggested that the Intelligence Quota, rather than years of schooling, influences performance on the test. In our study, we also found interaction between age and educational level only in B1, A7 and proactive interference. It is important to emphasize that in A7 focal analysis there was a significant effect of the age-group factor only in the primary- and secondary-level subjects, but not in the university-level ones. This result suggests that educational level could have a beneficial impact on age effect upon cognition. Nonetheless, since we had a small amount of individuals with university level, these results, as well as the other interactions, should be cautiously interpreted. Future researches addressing this issue can explore the role of the interaction between age and memory performance measured by RAVLT.

Our results show a significant difference between the performance of women and men, the former presenting higher performance, thus corroborating the findings of Geffen et al.,[8] Bolla-Wilson & Bleecker,[19] Vakil & Blachestien[17] and Van Der Elst et al.[18] Nevertheless, other authors have not seen this difference.[7]

We also observed a gradual decrease in memory capacity amongst older individuals. These findings are in accordance with those observed by other authors.[5-11,18]

Proactive and retroactive interference, as well as forgetting speed, were calculated with the use of quotients, rather than differences, as recommended by Geffen et al.[8] The rate of

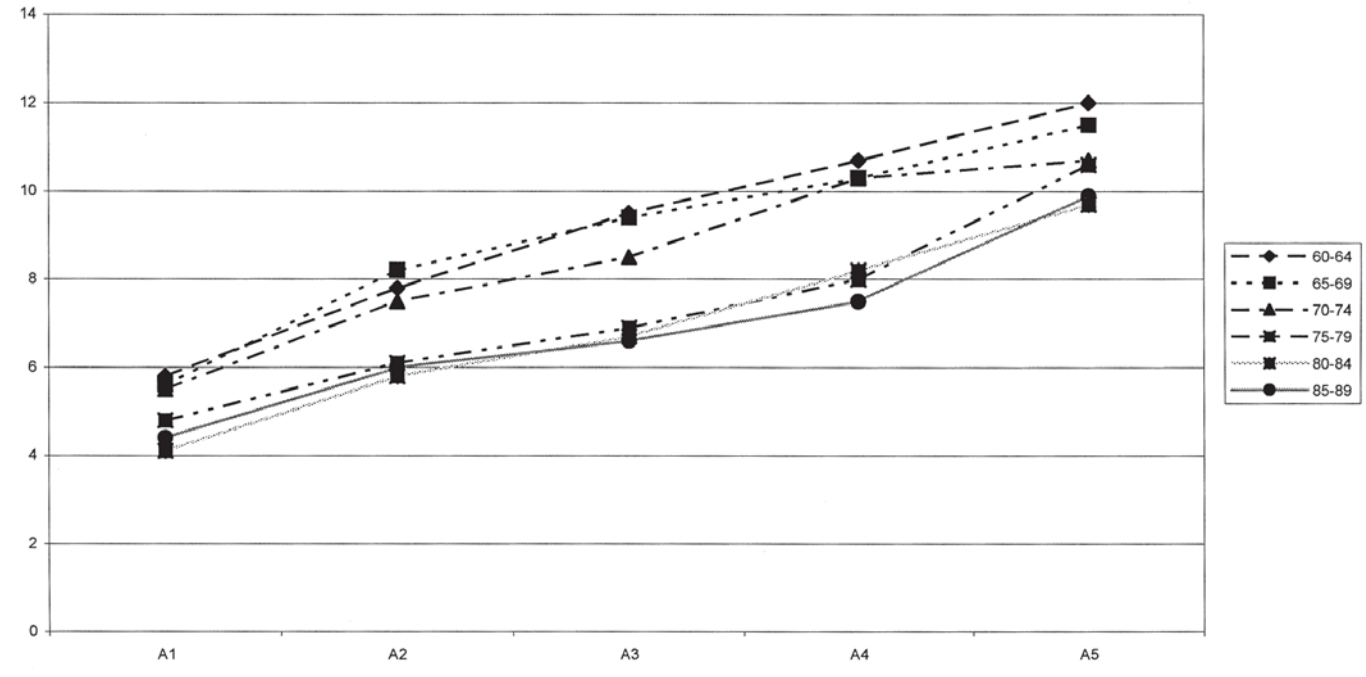

Figure 1 - RAVLT learning curve of RAVLT across age groups

Table 2 - Performance for different measures on RAVLT according to age bracket

Age	60-64 Years			65-69 Years			70-74 Years			75-79 Years			80-84 Years			85-89 Years		
Item	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female	Total	Male	Female
	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)	Mean (SD)
A1	5.8 (1.1)	5.6 (1.2)	6.0 (1.1)	5.6 (1.5)	5.3 (1.4)	6.0 (1.6)	5.5 (1.5)	5.0 (1.1)	6.1 (1.7)	4.8 (0.6)	4.9 (0.4)	4.8 (0.7)	4.1 (1.3)	3.5 (0.5)	4.9 (1.5)	4.4 (1.4)	4.1 (1.1)	4.5 (1.6)
A2	7.8 (1.5)	7.6 (1.2)	7.9 (1.7)	8.2 (1.8)	7.8 (1.8)	8.7 (1.7)	7.5 (1.3)	7.4 (1.0)	7.6 (1.7)	6.1 (0.7)	6.3 (0.7)	5.9 (0.7)	5.8 (1.1)	5.5 (0.7)	6.1 (1.4)	6.0 (1.7)	6.1 (1.6)	6.0 (1.8)
A3	9.5 (1.7)	9.0 (1.4)	10.0 (1.8)	9.4 (1.7)	9.0 (1.6)	9.9 (1.7)	8.5 (1.5)	7.8 (1.1)	9.4 (1.3)	6.9 (0.8)	7.0 (0.8)	6.9 (0.8)	6.7 (1.7)	6.5 (2.0)	6.9 (1.5)	6.6 (1.4)	6.6 (1.5)	6.5 (1.5)
A4	10.7 (1.6)	10.2 (1.6)	11.3 (1.4)	10.3 (1.7)	9.9 (1.9)	10.8 (1.4)	10.3 (1.8)	10.0 (1.1)	10.7 (2.3)	8.0 (0.7)	8.0 (0.7)	8.0 (0.7)	8.2 (1.6)	8.5 (1.4)	7.9 (1.8)	7.5 (1.5)	7.6 (1.8)	7.4 (1.4)
A5	12.0 (1.4)	11.8 (1.6)	12.2 (1.2)	11.5 (2.0)	11.1 (2.0)	12.0 (1.9)	10.7 (1.6)	10.1 (1.5)	11.3 (1.6)	10.6 (1.1)	10.7 (1.0)	10.5 (1.1)	9.7 (1.7)	9.4 (1.7)	10.1 (1.5)	9.9 (2.1)	9.5 (1.5)	10.1 (2.4)
B1	4.6 (0.7)	4.6 (0.7)	4.7 (0.7)	4.7 (1.4)	4.4 (1.4)	5.0 (1.4)	4.5 (1.8)	4.4 (1.2)	4.8 (2.2)	3.9 (0.8)	4.1 (0.6)	3.7 (3.8)	2.9 (1.7)	2.8 (1.6)	3.0 (1.9)	3.7 (1.6)	3.8 (2.6)	3.6 (3.9)
A6	10.9 (1.7)	10.7 (1.7)	11.1 (1.6)	9.9 (2.3)	9.3 (2.4)	10.6 (2.0)	9.3 (1.9)	9.2 (1.9)	9.5 (1.9)	8.5 (0.6)	8.4 (0.5)	8.6 (0.6)	8.7 (2.0)	8.2 (1.4)	9.2 (2.5)	7.4 (2.2)	7.4 (1.9)	7.5 (2.4)
A7	10.2 (2.1)	9.8 (1.7)	10.6 (2.4)	9.7 (2.5)	9.1 (2.4)	10.5 (2.5)	8.7 (1.8)	8.2 (1.6)	9.2 (2.0)	7.9 (0.5)	7.9 (0.5)	7.9 (0.5)	7.3 (2.1)	7.2 (1.8)	7.3 (2.6)	6.4 (2.0)	6.1 (2.2)	6.6 (2.0)
ITP	0.8 (0.2)	0.9 (0.2)	0.8 (0.2)	0.9 (0.2)	0.8 (0.2)	0.9 (0.2)	0.9 (0.4)	0.9 (0.4)	0.8 (0.4)	0.8 (0.2)	0.8 (0.1)	0.8 (0.3)	0.7 (0.4)	0.8 (0.5)	0.6 (0.3)	0.9 (0.3)	0.9 (0.5)	0.9 (0.2)
ITR	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)	0.8 (0.1)	0.9 (0.1)	0.9 (0.2)	0.9 (0.2)	0.8 (0.2)	0.8 (0.1)	0.8 (0.1)	0.8 (0.1)	0.9 (0.2)	0.9 (0.1)	0.9 (0.2)	0.7 (0.2)	0.8 (0.2)	0.7 (0.2)
VE	0.9 (0.1)	0.9 (0.1)	1.0 (0.2)	1.0 (0.2)	1.0 (0.2)	1.0 (0.1)	0.9 (0.2)	0.9 (0.1)	1.0 (0.2)	0.9 (0.1)	0.9 (0.1)	0.9 (0.1)	0.8 (0.1)	0.9 (0.1)	0.8 (0.1)	0.9 (0.2)	0.8 (0.2)	0.9 (0.2)
ΣA1A5	45.7 (5.7)	44.2 (5.5)	47.3 (5.5)	45.0 (7.4)	43.1 (7.4)	47.5 (6.8)	42.5 (5.8)	40.3 (3.2)	45.0 (6.9)	36.4 (2.1)	36.8 (1.8)	36.1 (2.3)	34.5 (5.4)	33.3 (4.7)	35.9 (6.1)	34.4 (6.5)	34.0 (6.4)	34.6 (6.8)
REC	11.3 (2.8)	10.8 (2.5)	11.9 (3.1)	10.5 (3.0)	9.6 (3.1)	11.6 (2.5)	8.0 (4.0)	7.2 (4.7)	9.0 (2.8)	6.8 (2.1)	7.5 (2.8)	6.2 (0.7)	5.8 (4.2)	5.5 (4.4)	6.1 (4.3)	4.8 (4.7)	2.3 (5.3)	6.2 (3.9)
LOT	16.9 (3.8)	16.4 (4.3)	17.5 (3.1)	17.0 (5.7)	16.7 (5.3)	17.5 (6.2)	14.9 (5.1)	15.3 (4.4)	14.5 (5.9)	12.2 (2.6)	12.5 (2.3)	12.0 (3.0)	14.0 (5.1)	16.0 (5.5)	11.4 (3.3)	12.4 (5.3)	13.4 (3.7)	11.9 (6.1)

ITP: Proactive interference; ITR: Retroactive interference; REC: Recognition; ΣA1A5: Sum of words from A1 Through A5; VE: Forgetful speed

retroactive interference is particularly important, because it is a sensitive rate for the identification of groups of individuals with different memory disturbances.[8] The rate of retroactive interference was significantly lower in individuals aged between 85 and 89, compared to individuals aged between 60 and 64, showing a progressive decline in the capacity to inhibit the learning effect of new contents on contents learnt previously. Differences in forgetting speed were significant only in the comparison between individuals in the 65-69 age group, and the 80-84 age bracket, in which younger groups showed a higher performance. Other authors, such as Bolla-Wilson & Bleecker[19] and Geffen et al.,[8] have also reported a similar absence of differences between age groups for these rates, indicating that these abilities are relatively resistant to the aging process. Moreover, the cited study did not evidence any difference between age groups for rate of proactive interference.

Our results show some discrepancies if compared to those presented by Malloy-Diniz et al.[11] who also tested RAVLT in different age groups of Brazilian subjects. Since we found differences between the results of different age groups from 60 to 89 years of age, the analysis of these data as a whole sample would be inappropriate. Thus, unlike Malloy-Diniz[11] we divided the subjects ranging from 60 to 89 years old into six different age groups. In this way, the sample of the present study could be better characterized than that of the previous study. Furthermore, in the present study, women performed better than men in some sets of the test (A1, A3, A5 and sum of scores from A1 to A5). This is in accordance with several similar studies performed in other countries,[8,17-19] but not with the study of Malloy-Diniz et al.[11] This difference could be due to sample sizes, since Malloy-Diniz et al.[11] used a smaller sample than the one used at the present study, as well as the samples from other studies that detected a better performance in women.

The results of this study closely resemble findings by other authors who had used the English version of the test,[8,17] and adopted the same age groups studied in our research. This indicates that the adaptation was valid and that these results could be safely used to assess the memory capacity of aged Brazilians of similar age group and educational level.

It is important to observe, however, that our sample has some specific features that hinder the generalization of results. The selected individuals have a high level of formal education, being recruited from social clubs for elderly people. Therefore, different results can be found in subjects with lower formal education. Moreover, since we excluded subjects with psychiatric and neurological symptoms, our sample may have a better cognitive performance than the elderly population in general, as this bigger group includes an important set of individuals with some neurological or psychiatric conditions, mainly depression.

Studies comprising subjects with different socioeconomic status, as well as clinical populations, are being performed to add information on the validity of the test.

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