Original Article

Artigo Original

Applicability of the "An Object and Action Naming Battery" in Brazilian Portuguese

Aplicabilidade da "Bateria de Nomeação de Objetos e Verbos" no Português Brasileiro

Luisa Carmen Spezzano[1]
Letícia Lessa Mansur[2]
Márcia Radanovic[3]

Keywords

Evaluation
Speech, language and hearing sciences
Language tests
Names
Adult

ABSTRACT

Purpose: To verify the performance of a sample of Brazilian subjects in the "An Object and Action Naming Battery" (OANB), according to schooling; and to describe the main error types in nouns and verbs naming. **Methods:** The OANB was applied in 100 healthy subjects, divided in two groups (GI: four to eight years of schooling; and GII: above nine years). **Results:** There were correct answers for 97.6% for nouns and 98.0% for verbs. There were statistically significant differences between the groups in the number of correct answers for nouns and verbs ($p<0.0001$) and in the proportion of semantic errors for verbs ($p=0.0160$), with less educated subjects performing poorer than higher educated ones. **Conclusion:** The OANB may be used in adult Brazilian Portuguese native speakers. The group with higher education had higher scores; both groups had a higher proportion of "semantic errors" for verbs and nouns.

Descritores

Avaliação
Fonoaudiologia
Testes de linguagem
Nomes
Adulto

RESUMO

Objetivo: Verificar o desempenho de sujeitos brasileiros na Bateria de Nomeação de Objetos e Verbos (BNOV), de acordo com a escolaridade; e descrever os principais tipos de erro na nomeação de verbos e substantivos. **Métodos:** A BNOV foi aplicada em 100 sujeitos normais, divididos em dois grupos (GI: quatro a oito anos de escolaridade; e GII: acima de nove anos). **Resultados:** Houve índice total de acertos de 97,6% para os substantivos e 98,0% para verbos. Foram verificadas diferenças estatisticamente significantes entre os grupos no número de acertos para substantivos e verbos ($p<0,0001$) e na proporção de ocorrência de erros semânticos para verbos ($p=0,0160$), registrando-se pior desempenho entre os sujeitos menos escolarizados. **Conclusão:** A BNOV é adequada para uso em adultos falantes do Português Brasileiro. O grupo com maior escolaridade apresentou maior número de "acertos"; ambos os grupos tiveram maior proporção de "erros semânticos" para verbos e substantivos.

Correspondence address:
Luisa Carmen Spezzano
R. Dom Sebastião Tomás, 128,
Bosque da Saúde, São Paulo (SP), Brasil,
CEP: 04136-100.
E-mail: spezzanolc@yahoo.com.br

Received: 10/29/2012

Accepted: 08/22/2013

Study conducted at the Department of Neurology of the School of Medicine, Universidade de São Paulo – USP – São Paulo (SP), Brazil.
(1) Department of Neurology of the School of Medicine , Universidade de São Paulo, São Paulo (SP), Brazil.
(2) Department of Physical Therapy, Speech Language Pathology and Audiology, and Occupational Therapy of the School of Medicine, Universidade de São Paulo – USP – São Paulo (SP), Brazil.
Conflict of interests: nothing to declare.

INTRODUCTION

Naming is one of the most important tasks in language processing. It requires the retrieval of phonological and semantic information organized in a memory system and accessed according to the particularities of a given stimulus[1,2].

Based on the principles of cognitive neuropsychology[2,3], the process of visual naming is composed of three stages: identification of the object presented, which activates its structural representation; access to its semantic representation, which allows the object to be recognized; and lexicalization or activation of phonological representation, through which the name of the picture is retrieved and pronounced.

Some factors interfere with the performance of this task, such as the frequency of occurrence of a given lexical item within a language and acquisition age, as well as the grammatical and semantic category of the stimulus.

Nouns and verbs have semantic properties[4] but differ in regards to their grammatical properties. Current studies highlight that this difference is correlated to a dissociation in the neural processing of verbs and nouns[5–7].

Naming is assessed by means of general visual confrontation naming tests, such as the Snodgrass and Vanderwart pictures[1] and the Boston Naming Test (BNT)[8], or specific naming tests used to assess different semantic and grammatical categories, such as the Category-Specific Naming Test[9] and the Object and Action Naming Battery (OANB)[10].

In similarity to what occurs with other language skills, naming also suffers the influence of schooling[8]. Therefore, the latter must always be considered in studies conducted with the Brazilian population, where a large amount of individuals have restricted or no access to formal instruction. Moreover, education is quite heterogeneous in the institutions spread over the country's regions[8].

Although several assessment instruments are available for adult populations, the tests that have been adapted to Brazilian Portuguese are few, especially in relation to verb naming.

The aims of this study are: to evaluate the performance of an adult population of Brazilian Portuguese speakers in the OANB, according to schooling, and to describe the main types of deviant answers provided by normal individuals in the same naming task.

METHODS

This study was approved by the Ethics Committee of the Clinics Hospital of the School of Medicine at University of São Paulo (protocol 0814/09). All participants signed the Informed Consent.

The test used was the American OANB, which assesses an individual's visual confrontation naming ability through black and white line drawings divided in two presentation lists that amount to a total of 162 objects and 100 verbs.

The stimuli used in the test were selected and ordered according to the following criteria: frequency, acquisition age, familiarity, visual concordance, and visual complexity. In addition, we took into consideration parameters of naming consistency and the grammatical form of the verbs.

The elaboration of the version in Brazilian Portuguese was based on the criteria listed in Recommendations for the Cross-Cultural Adaptation of the DASH & Quick DASH Outcome Measures[11] (Chart 1).

We considered four types of deviant answers in the analysis of the individuals' results (Chart 2). Three professionals with experience in the area of language analyzed the answers independently.

Chart 1. Description of the criteria for translation and adaptation of the Object and Action Naming Battery answer sheet

Step	Description
1. Initial translation	Two independent translations were provided by two translators proficient in Brazilian Portuguese and English; The translations were compared, and the discrepancies were solved by consulting the translators
2. Synthesis of both translations	Based on the original instrument and on both the translations, a single version was elaborated by one of the researchers
3. Reverted translation	The single version elaborated by the researcher was once again translated by two translators into the original language of the test
4. Revision by the committee of specialists	In this stage, the judges evaluated: 1. Semantic and idiomatic equivalencies (word meaning and use of expressions in both the languages); 2. Conceptual equivalence (coherence of the items); and 3. Cultural equivalence (situations presented in the instrument had to correspond to those experienced in the cultural context of Brazilian Portuguese)
5. Test of the pre-final version	This is the stage in which the test was applied in the population of Brazilian Portuguese speakers. Three researchers with experience in the area of neurolinguistics analyzed the answers provided by the individuals evaluated

Chart 2. Answer types

Answers	Definition
Correct answer	Designation of the target word
Synonym	A word that does not modify the meaning of the target word, according to consultation to a dictionary of Brazilian Portuguese
Phonemic error	Target word with phoneme substitution
Semantic error	Word that semantically substitutes the target word
Visual error	Word with visual substitutions of the stimulus presented: naming of part of the image or similar object

In the item "revision by the committee of specialists", some adaptations were necessary in order to obtain a closer equivalence between the Brazilian and the original versions of the answer sheet:

- for the nouns in item 71, we considered the word *"quintal"* ("backyard") as the correct answer due to the visual equivalence of the stimulus presented;
- for the verbs in item 7, we considered the target word *"batendo bola"* ("playing ball") as the correct answer due to the visual and semantic equivalence of the stimulus presented; and
- in item 60, the word *"varrendo"* ("sweeping") was considered correct due to the visual and semantic equivalence of the stimulus presented.

During the testing phase of the pre-final version of the test, the OABN stimuli were presented in sequence and the participants were instructed to say the first name that came to mind upon looking at the stimulus based on the following questions: "what is this?" for the nouns, and "what is he doing?" for the verbs.

The OANB was conducted with 100 individuals that have lived in the city of São Paulo for over 20 years, who are also family members of patients undergoing speech therapy. They were divided into two groups according to their schooling: GI (between four and eight years of schooling), and GII (nine or more years of education).

GI was composed of 52 individuals between 23 and 87 years of age (Mean (M)=56.7; standard deviation (SD)=17.9), with formal schooling that varied between four and eight years (M=6.2; SD=1.7). GII gathered 48 individuals between 23 and 77 years of age (M=53.3; SD=15.2), with formal schooling that ranged from nine to 23 years (M=13.0; SD=3.6).

The individuals in both the groups met the following inclusion criteria: no complaints or evidence of cognitive dysfunction; independence to perform daily activities; no history of neurological or psychiatric illnesses; no use of medication that could interfere with cognitive processing; and native speakers of Brazilian Portuguese. Individuals with non correctable visual and auditory deficit were excluded from this study.

We used the following tests as cognitive screening:

- Mayo Older American Normative Studies (MOANS), for individuals without neuropsychological compromise[12];
- Mini Mental State Examination (MMSE)[13] with minimum score of 25 points for individuals with four years of schooling, 26 points for individuals with five to eight years of schooling, and 28 points for individuals with nine or more years of schooling;
- Verbal Semantic Fluency[14] – minimum score of 13 points for four years of schooling, 14 for four to seven years of schooling, and 16 for eight or more years of schooling;
- MAC-Q Questionnaire[15], to evaluate memory deficit with a maximum score of 24; and
- Hamilton Scale[16] for the assessment of depression with a maximum score of 7.

For the statistical analysis, we calculated the Mean and Standard Deviation for the scores obtained by the individuals in GI and GII in relation to the variables "correct answer", "synonyms", "semantic errors", and "visual errors" in the task of naming nouns and verbs.

The performance of both groups was compared through the Student's *t*- test. Next, we computed the total frequency of occurrence of deviant answers in GI and GII, as well as their subtypes: "synonyms", "semantic errors", "visual errors", and "phonemic errors". The frequency of the occurrence of deviant answers in both the groups was compared using Pearson's chi-square test.

The influence of the variable age on the amount of correct answers and the occurrence of semantic and visual errors was verified through the test of analysis of covariance (ANCOVA).

We then identified and analyzed the number of stimuli in which the percentage of correct answers was below 90%.

All analyses were performed using the program MedCalc® for Windows, version 12.3.0.0, with a significance p-value <0.05.

RESULTS

Table 1 displays the individuals' demographic data and performance in the tasks of cognitive screening. In regards to the overall performance of both the groups, there were statistically significant differences between GI and GII in the total number of correct answers, use of synonyms, and semantic errors made in relation to nouns and verbs (Table 2).

There were statistically significant differences between GI and GII concerning the total frequency of occurrence of deviant answers for nouns and verbs, and the occurrence of verb-related visual errors (Table 3).

In regard to nouns, we registered a higher proportion of "semantic errors" in both the groups, followed by "visual errors" and "synonyms" in GI, and equal proportion of "visual errors" and "synonyms" in GII.

In relation to the verbs, there was a higher proportion of deviant answers of the type "semantic errors" in GI, followed by "synonyms", "phonemic errors", and "visual errors"; in GII, we verified a higher proportion of deviant answers of the type "synonyms" followed by "semantic errors", "visual errors", and "phonemic errors".

The analysis of covariance did not evidence influence of age on the individuals' performance in naming nouns and verbs in relation to the variables: number of correct answers (F-ratio=0.3003; p=0.5850 for nouns, and F-ratio=1.1360; p=0.2890 for verbs), semantic errors (F-ratio=0.4032; p=0.5270 for nouns, and F-ratio=0.6109; p=0.4360 for verbs), and visual errors (F-ratio=0.0409; p=0.8400 for nouns, and F-ratio=0.0089; p=0.9250 for verbs).

Out of the 162 stimuli used in the test of noun naming, there was a ratio of correct answers lower than 90% in four of them, namely "*juiz, ninho, plugue*, and *rastelo*" ("judge, nest, plug, and rake"). Out of the 100 stimuli that compose the test of verb naming, the same occurred in two of them (2%): "*derrubando*

Table 1. Demographic data and performance of the individuals in tasks of cognitive screening

Variable	GI (n=52)	GII (n=48)	p-value
	Mean±SD (Interval)	Mean±SD (Interval)	
Age	56.7±17.9 (23–87)	53.3±15.2 (23–77)	0.3010
Schooling	6.2±1.7 (4–8)	13.0±3.6 (9–23)	<0.0001
Sex			
Female	32	25	0.4520
Male	20	23	
Handedness			
Right	49	46	0.9260
Left	3	2	
Mini Mental State Examination	28.7±1.4 (26–30)	29.4±0.7 (28–30)	0.0020
Verbal fluency	17.2±2.6 (14–24)	20.7±3.4 (16–26)	<0.0001
MAC-Q Questionnaire A (SD)	20.3±1.0 (18–21)	20.7±1.9 (17–23)	0.2820
Hamilton depression scale	4.3±1.9 (1–7)	3.6±1.5 (1–6)	0.0630

Legend: GI = group with four to eight years of schooling; GII = group with nine or more years of schooling; SD = standard deviation

Table 2. Group performance on the Object and Action Naming Battery

Variable	GI	GII	p-value
	Mean±SD	Mean±SD	
Nouns			
Correct answers	159.90±2.1	161.60±0.8	<0.0001
Synonym	0.46±0.7	0.14±0.4	0.0050
Total (correct answers + synonyms)	160.40±1.9	161.80±0.6	<0.0001
Semantic errors	1.40±1.5	0.12±0.5	<0.0001
Visual errors	0.17±0.5	0.06±0.2	0.1420
Total errors	1.59±1.9	0.18±0.6	<0.0001
Verbs			
Correct answers	95.90±3.3	98.40±1.9	<0.0001
Synonyms	2.90±1.8	1.40±0.2	<0.0001
Total (correct answers + synonyms)	98.90±1.7	99.80±0.4	<0.0010
Semantic errors	0.80±1.5	0.10±0.3	0.0030
Visual errors	0.09±0.3	0.04±0.2	0.3460
Total errors	0.90±1.5	0.10±0.4	0.0010

Caption: GI = group with four to eight years of schooling; GII = group with nine or more years of schooling; SD = standard deviation

and *tecendo*" ("dropping" and "weaving"). In both cases, the errors occurred exclusively in GI.

DISCUSSION

Studies in the literature[17,18] point that translated language tests must be used cautiously due to linguistic and cultural differences that compromise the sensibility and specificity of a given test.

The OANB is utilized to assess naming ability, and it can be used both in the diagnosis of anomia and during the patients' rehabilitation process. The verification of the nature of the errors and the dissociation among different grammatical categories in an individual's performance can contribute to the diagnosis by providing clues about the specific naming process that has been compromised.

This study aimed at applying the OANB in a population of normal adults, speakers of Brazilian Portuguese, according to their schooling. For this purpose, we used the test's original pictorial stimuli, and translated and adapted the answer sheet, thus establishing which words would be accepted as the correct answers. The criteria adopted were important for the instrument to become equivalent to the original test[18].

Besides the criteria prescribed to use the test in another language, other factors must be considered, such as the interference of age and schooling with the task of visual naming.

In our study, the group with more schooling years (GII) presented higher scores of "correct answers" in both grammatical

Table 3. Deviant answers for nouns and verbs in GI and GII

Variable	GI	GII	p-value
	Mean±SD	Mean±SD	
Nouns			
Deviant answers (%)*	42±25.9	12±7.4	<0.0001
Answer type**			
Synonyms	7±16.7	3±25.0	0.8170
Semantic errors	24±57.1	6±50.0	0.9140
Visual errors	10±23.8	3±25.0	0.7660
No answer	1±2.4	0±0.0	N/A
Verbs			
Deviant answers (%)*	38±38.0	17±17.0	0.0010
Answer type**			
Nouns	13±34.2	9±52.9	0.3120
Semantic errors	26±68.4	5±29.4	0.0160
Visual errors	4±10.5	2±11.7	0.7360
Phonemic errors	9±23.7	1±5.9	0.2290

*Refers to the total number of stimuli (162 nouns and 100 verbs)

**refers to the total number of errors (42 in GI and 12 in GII in relation to nouns; 38 in GI and 17 in GII in relation to verbs)

Caption: GI = group with four to eight years of schooling; GII = group with nine or more years of schooling; N/A = non-applicable; SD = standard deviation

categories. As it is described in the literature[19,20], there was an association between higher schooling and better performance in this task. We observed that the group with more years of schooling was also able to provide a higher proportion of deviant answers, classified as "synonyms". These results attest the influence of schooling in the use of expressive vocabulary, easy access to semantic representations, and compensations for access difficulties or lack of lexical knowledge.

In regards to the type of error, both the groups presented a higher proportion of "semantic errors" when naming nouns and verbs. In the task of verb naming, this finding was even more significant in the less schooled group. In both the groups, "visual errors" were the second most frequent type of error for nouns while in the less schooled group "phonemic errors" were the second most frequent type of error for verbs, followed by "visual errors". The opposite was found in the group with more schooling years.

The rate of correct answers was higher than 90% in 158 stimuli (97.6%)for the nouns, and 98 (98%) for the verbs in the group with less schooling years. In the more schooled group, this minimum rate of correct answers was found in all stimuli.

In our sample, age did not influence the groups' performances.

With the purpose of obtaining naming data in an adult population, the authors of the OANB[10] applied the original test in 45 healthy elderly individuals divided into two groups according to their age. One of the groups was composed of 23 individuals between 61 and 70 years of age with M=2.82 (SD=1.87) for nouns, and M=3.05 (SD=2.40) for verbs. The other group comprised 22 people between 71 and 80 years of age with M=4.23 (SD=2.72) for nouns, and M=5.41 (SD=4.10) for verbs. In the classification of the errors, answers with synonyms, stimuli components, or self-correction were excluded. In our sample, using the same criteria described in the original test, the total number of errors was lower for both grammatical categories (Table 2). It is important to consider, however, that our sample was composed of younger individuals.

In regards to grammatical categories specifically, we highlight the differentiation between the naming of verbs and nouns. There are two main research lines that seek to understand this distinction[6]: the first affirms that the dissociation between a noun and a verb is based on semantic aspects, while the latter states that this differentiation is based on syntactic functions.

Aspects related to semantic knowledge and the stimulus presented predominate in the OANB, both for object and verb naming. For these stimuli, the authors suggest classifying different semantic categories[21].

Nouns are subdivided into:
1 – human beings;
2 – animals;
3 – plants;
4 – foods;
5 – body parts;
6 – places;
7 – objects; and
8 – shapes.

All verbs in the OANB are action verbs that characterize an activity performed by an individual; they are subdivided into:
1 – verbs associated with the face;
2 – verbs associated with the body without the presence of an instrument;
3 – verbs associated with the body with the presence of an instrument;
4 – verbs related to people;
5 – verbs related to objects;
6 – actions performed with small instruments;
7 – actions performed with big instruments;
8 – purposeful actions performed without a specific instrument;
9 – verbs associated with animals; and
10 – verbs associated with natural phenomena.

Studies in the literature[22] used to defend that nouns are more easily represented in relation to verbs with the use of static images. However, current authors[23] have found no significant statistical difference between verb naming with the use of static and dynamic representations. They report that pictures of temporarily static actions allow the individuals to inspect them in their own rhythm and, thus, consider what verb is being represented. In our study, we did not verify the interference of this aspect with the answers provided by the groups.

Nouns are acquired early in the process of language development, while verbs are rare until an individual reaches the stage of vocabulary expansion, given that the semantic structure of verbs are inherently more complex, and objects are easier to be concretely represented[24].

If we compare the acquisition of verbs and nouns over the course of lexical development in childhood, it is verifiable that a child's verb repertoire begins to increase once he/she has acquired between 50 and 100 words, expanding until he/she achieves about 500 words. At that moment, the proportion between verbs and other words is balanced, when the child is approximately between three and four years old[25,26].

In relation to neural processing, studies[27,28] describe that the temporal lobe, responsible for the interface of phonological representation and visual semantic representation, is mostly related to nouns, while the frontal lobe, responsible for the representation of motor actions, relates mostly to verbs.

In regards to the semantic properties of verbs specifically, the primary motor cortex is activated in tasks of representation, and not of lexical decision among action verbs, which suggests that neural substrates are determined based on their semantic properties instead of their syntactic properties[29].

In a study[8] conducted with the BNT in a population of 133 healthy Brazilian individuals, it was observed that the rate of correct answers was 63% in the group with less school years (up to eight years of formal education), and 81% in the group with more school years (nine or more).

Therefore, we could observe that our population's performance in the OANB was superior to the ratio found for the BNT, which can be explained by the better adequacy of the psychometric properties of this instrument, due to the increasing evolution of knowledge about the basic mechanisms of neurolinguistic processing. In this sense, the similarities that exist among neural processing mechanisms can partially compensate for the cultural and linguistic differences inherent to the use of tests created in another language, especially those that employ single words (as opposed to complex sentences and texts) and present stimuli visually.

CONCLUSION

The application of the OANB to our sample allowed us to verify that the population evaluated in this study presented high averages and ratios of correct answers, which indicates that the instrument can be utilized with native speakers of Brazilian Portuguese.

The more schooled group registered higher scores of correct answers, and this result is corroborated in studies on the positive correlation between schooling level and performance in linguistic tasks. Both the groups presented a higher proportion of "semantic errors" in both grammatical categories (nouns and verbs).

More studies that include individuals from other regions of Brazil are necessary in order to establish the standardization of the OANB battery for the Brazilian population.

**LCS was responsible for data collection and tabulation; LLM collaborated with data collection and tabulation, and supervised data collection; MR supervised data collection, and collaborated with their analysis; LCS, LLM, and MR were responsible for the project, study outline, and overall supervision of the stages of manuscript writing and elaboration.*

REFERENCES

1. Snodgrass JG, Vanderwart M. A standardized set of 260 pictures: norms for name agreement, image agreement, familiarity, and visual complexity. J Exp Psychol Hum Learn. 1980;6(2):174-215.
2. Peña-Casanova J, Pamies MP. Reabilitação da afasia e transtornos associados. 2ª ed. São Paulo: Manole; 2005. 300 p.
3. Hillis A. Cognitive neuropsychological approaches to rehabilitation of language disorders: introduction. In: Chapey R. Language intervention strategies in aphasia and related neurogenic communication disorders. 5ª ed. Philadelphia: Lippincott Williams & Wilkins; 2008.
4. Pillon A, d'Honincthun P. The organization of the conceptual system: the case of the "object versus action" dimension. Cogn Neuropsychol. 2011;27(7):587-613.
5. Sörös P, Cornelissen K, Laine M, Salmelin R. Naming actions and objects: cortical dynamics in healthy adults and in an anomic patient with a dissociation in action/object naming. Neuroimage. 2003;19(4):1787-801.
6. Shapiro KA, Mottaghy FM, Schiller NO, Poeppel TD, Flüss MO, Müller HW, Caramazza A, Krause BJ. Dissociating neural correlates for nouns and verbs. Neuroimage. 2005;24(4):1058-67.
7. Rudrauf D, Mehta S, Bruss J, Tranel D, Damasio H, Grabowski TJ. Thresholding lesion overlap difference maps: application to category-related naming and recognition deficits. Neuroimage. 2008;41(3):970-84.
8. Mansur LL, Radanovic M, Araújo GC, Taquemori LY, Greco LL. Teste de nomeação de Boston: desempenho de uma população de São Paulo. Pró-Fono R Atual Cient. 2006;18(1):13-20.
9. McKenna P. Category-specific names test. Philadelphia: Psychology Press; 1997.
10. Drucks J, Masterson J. An object and action naming battery. Philadelphia: Psychology Press; 2000.
11. Beaton D, Bombardier C, Guillemin F, Ferraz MB. Recommendations for the Cross-cultural adaptation of the DASH & Quick DASH Outcome Measures. Institute for Work & Health; 2007.
12. Smith GE, Ivnik RJ. Normative neuropsychology. In: Petersen RC. Mild cognitive impairment, New York: Oxford; 2003. p. 63-88.
13. Brucki SMD, Nitrini R, Caramelli P, Bertolucci PHF, Okamoto IH. Sugestões para o uso do mini-exame do estado mental no Brasil. Arq Neuropsiquiatr. 2003;61(3):777-81.
14. Brucki SMD, Malheiros SMF, Okamoto IH, Bertolucci PHF. Dados normativos para o teste de fluência verbal categoria animais em nosso meio. Arq Neuropsiquiatr. 1997;55(1):56-61.
15. Xavier FM, Ferraz MP, Trentini CM, Freitas NK, Moriguchi EH. Bereavement-related cognitive impairment in an oldest-old community-dwelling Brazilian sample. J Clin Exp Neuropsychol. 2002;24(3):294-301.
16. Hamilton M. A rating scale for depression. J Neurol Neurosurg Psychiatry. 1960;23:56-62.

17. Guillemin F, Bombardier C, Beaton D. Cross-cultural adaptation of health-related quality of life measures: literature review and proposed guidelines. J Clin Epidemiol. 1993;46(12):1417-32.
18. Giusti E, Befi-Lopes DM. Tradução e adaptação transcultural de instrumentos estrangeiros para o Português Brasileiro (PB). Pró-Fono R Atual Cient. 2008;20(3):207-10.
19. Radanovic M, Mansur LL, Scaff M. Normative data for the Brazilian population in the Boston Diagnostic Aphasia Examination: influence of schooling. Braz J Med Biol Res. 2004;37(11):1731-8.
20. Rüegg D. Análise da influência de variáveis demográficas: escolaridade e idade no conhecimento de categorias semânticas em indivíduos normais [dissertação]. São Paulo: Faculdade de Medicina da Universidade de São Paulo; 2004.
21. Shapiro KA, Mottaghy FM, Schiller NO, Poeppel TD, Flüss MO, Müller HW, Caramazza A, Krause BJ. Dissociating neural correlates for nouns and verbs. Neuroimage. 2005;24(4):1058-67.
22. Masterson J, Druks J. Description of a set of 164 nouns and 102 verbs matched for printed word frequency, familiarity and age of acquisition. J. Neurolinguist. 1998;11(4):331-54.
23. Damasio H, Grabowski TJ, Tranel D, Ponto LL, Hichwa RD, Damasio AR. Neural correlates of naming actions and of naming spatial relations. Neuroimage. 2001;13(6 Pt 1):1053-64.
24. Tranel D, Manzel K, Asp E, Kemmerer D. Naming dynamic and static actions: neuropsychological evidence. J Physiol Paris. 2008;102(1-3):80-94.
25. Campos TF, Carvalho SM, Melo LP, Lima ACA. Figuras de atividades funcionais: concordância de nomeação e familiaridade. Psicol Teor Pesqui. 2008;24(3):323-30.
26. Befi-Lopes DM, Cáceres AM, Araújo K. Aquisição de verbos em pré-escolares falantes do português brasileiro. Rev CEFAC. 2007;9(4):444-52.
27. Befi-Lopes DM, Cáceres AM. Análise da diversidade de verbos enunciados na fala espontânea de pré-escolares brasileiros. Pró-Fono R Atual Cient. 2010;22(1):3-6.
28. Aggujaro S, Crepaldi D, Pistarini C, Taricco M, Luzzatti C. Neuro-anatomical correlates of impaired retrieval of verbs and nouns: interaction of grammatical class, imageability and actionality. J Neurolinguist. 2006;19(3):175-94.
29. Vigliocco G, Vinson DP, Druks J, Barber H, Cappa SF. Nouns and verbs in the brain: a review of behavioural, electrophysiological, neuropsychological and imaging studies. Neurosci Biobehav Rev. 2011;35(3):407-26.
30. Vigliocco G, Vinson DP, Siri S. Semantic similarity and grammatical class in naming actions. Cognition. 2005;94(3):B91-100.