

Oral language disorders in adults and older adults: relationship between disorder severity and performance on linguistic tasks

Transtornos da linguagem oral em adultos e idosos: relação entre a gravidade do transtorno e desempenho em tarefas linguísticas

Trastornos del lenguaje oral en adultos y ancianos: relación entre la gravedad del trastorno y el desempeño en tareas lingüísticas

Ana Paula Arruda Estery¹ 

Ananda Ramos-Pereira¹ 

Bárbara Costa Beber¹ 

Abstract

Language is a complex cognitive function involving processes of comprehension and communication production. **Purpose:** To verify the relationship between language disorder severity and the performance on language tasks in adults and older adults with oral language disorders. **Methods:** A retrospective cross-sectional quantitative study was carried out at the speech-language therapy service of a neurology outpatient clinic, with participants older than 18 years old, with diagnosis of oral language disorder. Participants' sociodemographic and clinical data were obtained, as well as performance on oral language tasks of the Montreal Toulouse Language Assessment Battery and the Boston aphasia severity scale. Data were analyzed using the Spearman correlation test. **Results:** The final study sample consisted of

¹ Universidade Federal de Ciências da Saúde de Porto Alegre, Porto Alegre, RS, Brazil.

Authors' contributions:

APAE: study design and article draft.

ARP: critical literature review, editorial adjustments.

BCB: study design, article draft, guidance, and translation of the text into English.

Correspondence address: ananda.ramos@gmail.com

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18 participants, aged 33 to 75 years, with the following diagnosis: classical aphasia (global, Wernicke's, Broca's, and anomic), primary progressive aphasia (logopenic and semantic variants), cognitive communication disorder, and non-aphasic language disorder. There was a statistically significant relation between aphasia severity and all language tasks assessed except oral word comprehension. The article discusses the tasks that showed the most relevant relation to severity. **Conclusion:** Almost all investigated language skills are related to the degree of severity of the disorder, demonstrating the importance of these skills for diagnosis and speech rehabilitation.

Keywords: Aphasia; Communication Disorders; Cognition; Neuropsychology; Language Disorders.

Resumo

A linguagem é uma função cognitiva complexa em que estão envolvidos processos de compreensão e produção comunicacionais. **Objetivo:** Verificar a relação entre a gravidade do transtorno de linguagem e o desempenho nas tarefas linguísticas em adultos e idosos com transtornos da linguagem oral. **Metodologia:** Foi realizado um estudo quantitativo transversal retrospectivo executado no serviço de fonoaudiologia do ambulatório de neurologia de um hospital, com participantes maiores de 18 anos, com o diagnóstico fonoaudiológico de transtorno da linguagem oral. Foram obtidos os dados sociodemográficos e clínicos dos participantes, assim como o desempenho em tarefas de linguagem oral da Bateria Montreal Toulouse de Avaliação da Linguagem e a escala de severidade da afasia de Boston. Os dados foram analisados utilizando o teste de correlação de *Spearman*. **Resultados:** A amostra final do estudo foi composta por 18 participantes, com idades entre 33 e 75 anos, com os seguintes diagnósticos fonoaudiológicos: afasias clássicas (global, de Wernicke, de Broca e anômica), afasia progressiva primária (variantes logopênica e semântica), transtorno cognitivo da comunicação, e transtorno de linguagem não afásico. Houve relação estatisticamente significativa entre a severidade da afasia e todas as tarefas de linguagem avaliadas, exceto a compreensão oral de palavras. O artigo discute as tarefas que demonstraram relação mais relevante com a severidade. **Conclusão:** Praticamente todas as habilidades linguísticas investigadas possuem relação com o grau da severidade do transtorno, demonstrando a importância destas habilidades para o diagnóstico e reabilitação fonoaudiológica.

Palavras-chave: Afasia; Transtornos da Comunicação; Cognição; Neuropsicologia; Transtornos da Linguagem.

Resumen

El lenguaje es una función cognitiva compleja que implica procesos de comprensión y producción de comunicación. **Objetivo:** Verificar la relación entre la gravedad del trastorno del lenguaje y el desempeño en tareas lingüísticas en adultos y ancianos con trastornos del lenguaje oral. **Metodología:** Se realizó un estudio cuantitativo transversal retrospectivo llevado a cabo en el servicio de fonoaudiología del ambulatorio de neurología de un hospital, con participantes mayores de 18 años, con diagnóstico fonoaudiológico de trastorno del lenguaje oral. Se obtuvieron los datos sociodemográficos y clínicos de los participantes, así como el desempeño en tareas de lenguaje oral de la Bateria Montreal Toulouse de Evaluación del Lenguaje y la escala de severidad de la afasia de Boston. Los datos se analizaron utilizando la prueba de correlación de *Spearman*. **Resultados:** La muestra final del estudio estuvo compuesta por 18 participantes, con edades entre 33 y 75 años, con los siguientes diagnósticos fonoaudiológicos: afasias clásicas (global, de Wernicke, de Broca y anómica), afasia progresiva primaria (variantes logopénica y semántica), trastorno cognitivo de la comunicación y trastorno del lenguaje no afásico. Hubo una relación estadísticamente significativa entre la severidad de la afasia y todas las tareas de lenguaje evaluadas, excepto la comprensión oral de palabras. El artículo discute las tareas que mostraron una relación más relevante con la severidad. **Conclusión:** Prácticamente todas las habilidades lingüísticas investigadas tienen una relación con el grado de severidad del trastorno, lo que demuestra la importancia de estas habilidades para el diagnóstico y la rehabilitación fonoaudiológica.

Palabras clave: Afasia; Trastornos de la Comunicación; Cognición; Neuropsicología; Trastornos del Lenguaje.



Introduction

Oral language disorders observed in adult and older populations can be defined as linguistic difficulties that affect comprehension and/or expression abilities and are not consistent with the individual's age or level of education. Evaluating and characterizing possible language impairments across different neurological conditions, such as aphasias, dementias, or neuropsychiatric disorders, is essential for identifying and diagnosing these disorders¹. These conditions emerge after full language acquisition and result from acquired lesions or dysfunctions of the central nervous system (CNS), as well as from psychiatric conditions. They can be grouped into three main categories: cognitive-communication disorders, non-aphasic language disorders, and aphasic language disorders. The latter represent the most prevalent group and can be further subdivided into classical aphasias, subcortical aphasias, crossed aphasias, and primary progressive aphasias (PPAs). In contrast, non-aphasic language disorders and cognitive-communication disorders do not have formal subcategories².

Among the *aphasic language disorders*, classical aphasias are the most frequently encountered in speech-language therapy practice and are didactically divided into eight different types, categorized as fluent and non-fluent aphasias. In fluent aphasias, individuals are able to produce connected speech with structured sentences; however, deficits may be present in other language functions such as comprehension, naming, and/or repetition. This group includes Wernicke's aphasia, transcortical sensory aphasia, conduction aphasia, and anomic aphasia^{3,4}.

Non-fluent classical aphasias, on the other hand, are characterized by impaired fluency, including hesitations, speech effort, reduced utterance length, and the production of agrammatical sentences. This group includes Broca's aphasia, transcortical motor aphasia, mixed transcortical aphasia, and global aphasia. Among aphasic disorders, there are also less common classifications, such as crossed aphasia, which affects right-handed individuals with right hemisphere lesions, and subcortical aphasia, which results from damage to subcortical structures. Lastly, primary progressive aphasias (PPAs) represent a neurological syndrome of degenerative etiology, primarily characterized by

the progressive loss of language, especially during the first two years of disease progression^{3,5}.

Non-aphasic language disorders are defined as subtle language difficulties, often noticeable to the individual and the examiner, but difficult to detect through the evaluation of linguistic characteristics. Language performance in neuropsychological assessment is close to normal or within expected limits⁶.

In *cognitive-communication disorders*, deficits occur in non-linguistic cognitive functions that support language, such as memory, executive functions, and attention. Although linguistic functions are preserved, communication is still affected, and this may manifest as difficulties in expression, comprehension, reading, writing, and social interaction⁷.

The origin of oral language disorders in adults and older adults can stem from any type of brain injury affecting areas responsible for language and/or cognition. Such injuries may result from traumatic brain injury (TBI), stroke, CNS tumors, infectious diseases, neurodegenerative conditions, or even toxic-metabolic disorders⁸. However, the vast majority of these disorders are caused by cerebrovascular events, such as stroke, which, according to the World Health Organization (WHO), is the leading cause of disability in Brazil—with an annual incidence of 108 cases per 100,000 inhabitants—and the second leading cause of mortality in the country, second only to ischemic heart diseases^{9,10}. The various causes of brain injury can have a significant impact on the lives of affected individuals and their families. Just as linguistic and cognitive characteristics help define the communicative profile of individuals with oral language disorders, the severity of the condition also plays an important role in shaping this profile¹¹.

Aphasia severity is an important factor, as impairments in language comprehension and/or expression directly reflect the extent of deficits in functional communication. The correlation between disorder severity and performance on linguistic tasks helps identify which language skills are most affected¹² and, consequently, which ones require greater attention during therapy. This relationship is essential for guiding rehabilitation planning and prioritizing the most effective interventions.

In this context, it is advisable for speech-language therapists to understand which language

functions contribute most to disease severity, as these tend to become the primary focus of rehabilitation aimed at reducing impairments and minimizing the functional communicative impact on the patient's life. Accordingly, the present study aims to investigate the relationship between the severity of language disorders and performance on language tasks in adults and older adults with oral language impairments.

Material And Methods

Study design and setting

This is a retrospective, cross-sectional, quantitative study conducted at the speech-language therapy service of the neurology outpatient clinic at Santa Clara Hospital of *Irmandade Santa Casa de Misericórdia de Porto Alegre*, Brazil.

Participants and Sample

The study sample consisted of a convenience sample. Participants were selected from the database of the research project "*Assessment and therapy of speech-language disorders in neurological diseases*." The inclusion criteria were: individuals over 18 years of age, with a diagnosis of oral language disorder², who were treated at the aforementioned speech-language therapy service, and who agreed to participate in the study by signing the informed consent form (ICF). Individuals were excluded from the study if they had not undergone the speech-language assessments relevant to this research (namely, the Montreal-Toulouse Language Battery (MTL-BR) and the Boston Aphasia Severity Scale) or if they reported uncorrected hearing and/or visual impairments.

Procedures and Instruments

For data collection procedures, participants who met the inclusion and exclusion criteria were selected from the database. The data relevant to this study were then extracted, including sociodemographic information (sex, age, education level, and handedness), medical data (neurological diagnosis, time since diagnosis or symptom onset, and affected cerebral hemisphere), speech-language diagnosis based on the proposed classification system², and results from language assessments (MTL Battery and Boston Aphasia Severity Scale)^{1,13}.

The MTL Battery is an assessment tool adapted and validated for the Brazilian population. It in-

cludes a variety of tasks designed to evaluate basic oral and written language functions following brain injury. Its objective is to identify and characterize oral and written language disorders, apraxic and calculation difficulties, and to determine the type of aphasia present in the patient. However, for this study, only the tasks essential for characterizing oral language were analyzed: automatic language (form and content), oral comprehension of words and sentences, repetition of words and sentences, non-verbal praxis, and oral naming of words and sentences^{1,14,15}. The Boston Aphasia Severity Scale is one of the tasks within the Boston Diagnostic Aphasia Examination and allows for the classification of the severity of language disorders based on the speech-language therapist's observation of the patient's spontaneous speech¹³. According to this scale, aphasia severity is classified on a scale from one to six, where "one" represents the most severe language impairment and "six" indicates minimal language disadvantage. The severity levels¹³ are described as follows:

- Does not use functional speech or auditory comprehension.
- All communication is through fragmented expression; there is a high need for inference, questioning, or guessing by the communication partner. The amount of information that can be exchanged is limited, and the listener assumes most of the responsibility for communication.
- Conversation about familiar topics is possible with assistance from the communication partner. There are frequent breakdowns in conveying ideas, but the patient is able to share responsibility for communication.
- The patient can discuss almost all everyday problems with little or no assistance. However, reduced speech and/or comprehension makes conversation on certain topics impossible.
- There is an obvious loss of speech fluency or some difficulty with comprehension, but no significant limitation in the ideas expressed or the manner of expression.
- Minimal, noticeable disadvantage; the patient may experience subjective difficulties that are not obvious to the listener.

Ethics

The project "*Assessment and Therapy of Speech-Language Disorders in Neurological Diseases*," of which this study is a part, was sub-

mitted to and approved by the Ethics Committee of the Federal University of Health Sciences of Porto Alegre, under opinion number 2,538,220. Only data from patients who signed the ICF were used.

Statistical Analysis

Categorical variables were described using relative (%) and absolute (n) frequencies, while continuous variables were described using mean, median, minimum, maximum, and standard deviation. Data distribution was assessed using the Shapiro-Wilk test. Correlations between variables were tested using Spearman's correlation test, with a significance level set at 5%.

Results

In this study, 18 participants were included, the majority of whom were male, with ages ranging from young adult to older adult. The sample characteristics are presented in Table 1. Regarding speech-language diagnoses, the most frequent conditions, with an equal number of cases, were Broca's aphasia, global aphasia, cognitive-communication disorder, and semantic variant PPA. As for neurological diagnoses, extracted from the patients' medical records, stroke was the most frequent condition. Among all cases, the left cerebral hemisphere was the most commonly affected. The time since symptom onset or diagnosis varied, including both acute and chronic cases.

Table 1. Descriptive data of the sample regarding sociodemographic and clinical aspects

Variable	Mean (SD)	Min-Max	Med	N (%)
Age (years)	54.40 (12.49)	33-75	57	-
Sex (M)	-	-	-	10 (55.6)
Education (years)	8.58 (6.32)	0-21	7.5	-
Handedness (R)	-	-	-	16 (88.9)
Time of symptoms (years)	3.21 (2.39)	0.5-8	2.5	-
Speech-language diagnosis	-	-	-	-
CA- Broca	-	-	-	3 (16.7)
CA- Wernicke	-	-	-	1 (5.6)
CA- Anomic	-	-	-	1 (5.6)
CA- Global	-	-	-	3 (16.7)
Cognitive-communication disorder	-	-	-	3 (16.7)
Non-aphasic language disorder	-	-	-	1 (5.6)
Subcortical aphasia	-	-	-	1 (5.6)
PPA- semantic	-	-	-	3 (16.7)
PPA- logopenic	-	-	-	2 (11.1)
Neurological diagnosis	-	-	-	-
Stroke	-	-	-	11 (61.1)
PPA	-	-	-	5 (27.8)
Surgical removal of a neoplasm	-	-	-	1 (5.6)
Surgical clipping of an aneurysm	-	-	-	1 (5.6)
Injured cerebral hemisphere	-	-	-	-
Left	-	-	-	12 (66.7)
Both	-	-	-	1 (5.6)
Both, with predominance on the left	-	-	-	1 (5.6)
Both, with predominance on the right	-	-	-	1 (5.6)

CA= classic aphasia; M= male; Max= maximum; Med= median; Min= minimum; PPA= primary progressive aphasia; R= right; SD= standard deviation

The participants' linguistic profile is presented in Table 2.

Table 2. Descriptive data of the sample regarding language

Variable	Mean (SD) or N(%)	Min-Max	Med
Automatic language (total)	9.42 (2.68)	4-12	10
Automatic language (form)	4.92 (1.31)	3-6	5.5
Automatic language (content)	4.25 (1.86)	1-6	4
Oral comprehension (total)	14.83 (4.2)	6-19	16
Oral comprehension (words)	4.58 (0.9)	2-5	5
Oral comprehension (sentences)	10.33 (3.60)	2-14	11
Repetition (total)	15.08 (8.68)	4-33	29.5
Repetition (words)	8.75 (3.39)	2-13	10
Repetition (sentences)	15.08 (8.68)	1-22	20
Non-verbal praxis	19 (6.37)	0-24	20.5
Oral naming (total)	18.83 (9.41)	0-30	20
Oral naming (words)	14.58 (7.46)	0-24	16
Oral naming (sentences)	4.25 (2.42)	0-6	6
Boston Aphasia Severity Scale	3.75 (1.06)	2-5	3.5

Max= maximum; Med= median; Min= minimum; SD= standard deviation.

As shown in Table 3, the relationship between disorder severity and language tasks was tested. A significant correlation was found with all language tasks except for oral word comprehension. The strongest correlations¹⁶ were observed with

sentence repetition, total repetition, automatic language (content), and non-verbal praxis. The weakest correlations¹⁶ were found with word repetition, total oral comprehension, and automatic language (form).

Table 3. Correlation between severity of oral language disorders and performance on oral language tasks

Variable	Correlation coefficient	P value
Automatic language (total)	0.800	<0.00*
Automatic language (form)	0.624	0.01*
Automatic language (content)	0.896	<0.00*
Oral comprehension (total)	0.654	0.03*
Oral comprehension (words)	-0.17	0.947
Oral comprehension (sentences)	0.694	<0.00*
Repetition (total)	0.870	<0.00*
Repetition (words)	0.542	0.02*
Repetition (sentences)	0.929	<0.00*
Non-verbal praxis	0.870	<0.00*
Oral naming (total)	0.782	<0.00*
Oral naming (words)	0.748	<0.00*
Oral naming (sentences)	0.751	<0.00*

*=p<0,05 (Spearman correlation test)

Discussion

This study investigated the relationship between oral language tasks and the degree of language impairment severity in adults with oral language disorders. It was observed that all assessed language abilities showed a significant correlation with the severity of the disorder, except for oral word comprehension.

The severity of language disorders was evaluated through a task involving patients' spontaneous speech in informal situations, which may reflect the listener's subjective auditory perception of the individual's discourse. This judgment is influenced by the communicative context¹⁷, as in natural speech situations, interlocutors rely on contextual inferences to understand utterances and assign communicative intent. Therefore, it can be inferred that the tasks most strongly correlated with severity are precisely those that most impact the listener's auditory perception, making them priority targets in therapeutic interventions.

The language tasks that showed the strongest correlations with severity were sentence repetition, automatic language (content), non-verbal praxis, and total repetition. The speech repetition task assesses phonological and lexical processing (input and output), as well as the motor production of speech¹. Interventions that incorporate repetition, such as the Video-Implemented Script Training for Aphasia (VISTA) program, have demonstrated efficacy in rehabilitation by promoting intensive rehearsal of personalized scripts accompanied by audiovisual models. In this approach, repeating grammatically correct structures can enhance syntactic production even without explicit grammar training. In cases of non-fluent aphasia and acquired apraxia of speech following stroke, script training has been shown to improve speech accuracy, fluency, and motor quality¹⁸.

Automatic language is a sequential linguistic ability that involves learned sequences such as numbers, months of the year, songs, among others¹⁹. In the MTL Battery, this task evaluates the individual's ability to perform verbal sequences in an autonomous and automatic manner. In this study, automatic language (content) was strongly associated with severity, suggesting that deficits in automatic productions may reflect greater functional impairment. The literature²⁰ supports the use of automatic language tasks as a strategy to train

impaired linguistic abilities. Resources such as task progression, from phoneme recognition, followed by isolated production and manipulation, to more advanced stages involving automatic sequences of words and non-words²¹, promote improvements in communicative speech production.

Non-verbal praxis test, in turn, involves orofacial movements that do not require speech sound production. This task demands perception, analysis, and motor imitation, which rely on motor planning and oral comprehension. However, studies²² indicate that tasks such as blowing, whistling, tongue praxis, cheek inflation, and alternating between tongue stretching and protrusion may help facilitate speech-related movements by strengthening the involved structures at the muscular level. Thus, praxis deficits may directly or indirectly impact the articulatory production of speech, which could explain their strong correlation with disorder severity observed in this study.

On the other hand, the tasks with the weakest correlations were automatic language (form) and word repetition. The isolated repetition of words may have shown a weak correlation with severity because it does not adequately reflect the individual's communicative functionality, given that severity was measured based on connected spontaneous speech, which requires sentence-level production²³. Regarding automatic language (form), the absence of a strong relationship with severity may be due to its highly automated and less intentional nature, which contrasts with the more pragmatic and planned aspects evaluated in spontaneous speech.

Picture naming showed a moderate correlation with severity. This task requires visual recognition and access to the lexical-semantic system, making it sensitive to both cognitive and linguistic deficits²³. Therapeutic approaches focused on specific language tasks such as picture naming, reading, spelling, and comprehension of words and sentences¹² are often effective in reorganizing structure-function relationships in the brain, thus facilitating neuroplasticity. In the therapeutic context, combining impairment-based approaches with functional communication strategies such as picture naming alongside compensatory functional communication can be an effective way to integrate and restore the lexical-semantic system.

In contrast, oral word comprehension was the only task that did not show a significant relation-

ship with disorder severity. This may be explained by its low linguistic complexity, as the task simply requires matching an isolated word to an image, without the need for more complex syntactic or semantic processing, as is required in connected speech contexts. It is important to consider that oral comprehension depends on at least minimally preserved auditory acuity, so that auditory input is adequate for the cochlea and auditory nerve to transmit information to the auditory cortex. Additionally, factors such as educational level can significantly influence linguistic performance. Studies^{24,25} have shown that individuals with no formal education tend to perform worse on tasks such as oral comprehension, oral narrative discourse, word repetition, phonological/orthographic verbal fluency, number dictation, number reading, and written numerical calculations, when compared to those with low levels of education.

Sentence comprehension, in turn, showed a moderate correlation with severity, which may be related to the lexical-semantic impairment²⁶ observed in some participants. This task requires identifying images based on sentence-level auditory input, which involves not only syntactic comprehension but also semantic access, working memory, executive functions²⁷, and a minimally intact auditory system. Since language is a complex cognitive function, comprehension deficits can impact a wide range of communicative tasks in different ways, depending on the diagnosis and the individual's potential for recovery.

Factors such as aphasia severity, communication impairment, economic status, educational level²⁵, mood, and fatigue may all influence performance in activities of daily living¹¹. For this reason, interventions that focus more specifically on tasks and processes directly related to the severity of language disorders may significantly contribute to improving individuals' quality of life.

This study has limitations, including the small sample size and sample heterogeneity, particularly in terms of educational level and speech-language and medical diagnoses. Another limitation concerns the use of the Boston Aphasia Severity Scale, which is specifically designed for aphasia and may not adequately capture other types of language disorders. Future studies are recommended to use larger and more homogeneous samples, as well as more comprehensive assessment tools, in order to confirm the findings presented here.

Conclusion

The main contribution of this study lies in its integrated analysis of the correlation between disorder severity and specific oral language tasks, providing objective evidence to support therapeutic prioritization. Additionally, the findings reinforce existing evidence in the literature regarding the importance of repetition, automatic language, and non-verbal praxis in assessing severity.

The results confirmed that nearly all of the language skills investigated are directly related to the degree of language disorder severity. However, the most relevant were sentence repetition, automatic language (content), and orofacial praxis. Therefore, the evaluation of these tasks is essential for accurate speech-language diagnosis, and their use as a focus of rehabilitation is key to minimizing the impact of oral language disorders on individuals' quality of life.

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