

# Treatment-induced improvements in communicative abilities and spontaneous speech in chronic aphasia

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## Introduction

Aphasia adversely affects people with aphasia (PWA) quality of life due to the acquired communication limitations (Hilari et al., 2012). Improvement of quality of life correlates with improvements in language and communicative deficits (Spaccavento et al., 2013). While rehabilitation of PWA usually aims at decreasing their disability, the evaluation of spontaneous speech and communication abilities is a key tool to measure their real-life improvement. In this respect, the parameters-based analysis of spontaneous speech was proven to be more sensitive to post-treatment changes than spontaneous speech rating scales included in aphasia assessments (Grande et al., 2008). In the current study, we examine whether a verbal communicative abilities task and specific spontaneous speech parameters can be used as indicators of treatment-induced communication success in chronic aphasia.

## Methods

### *Participants*

Twenty monolingual Russian speakers (mean age: 54.5; SD = 10.1; 4 women) who suffered from a single left hemisphere stroke resulting in chronic aphasia (from 6 months post-onset) were included in the study. 12 participants were classified with nonfluent aphasia, 4 with fluent aphasia, and 4 with mixed aphasia. The patients were admitted to the Center for Speech Pathology and Neurorehabilitation (Moscow) for an intensive multidisciplinary treatment course. The frequency and the amount of received treatment were equal for all participants. For 6 weeks, 5 days per week each participant received 2 individual and 2 group therapy sessions by trained speech pathologists. The overall daily duration of speech therapy for a participant was equal to 160 minutes.

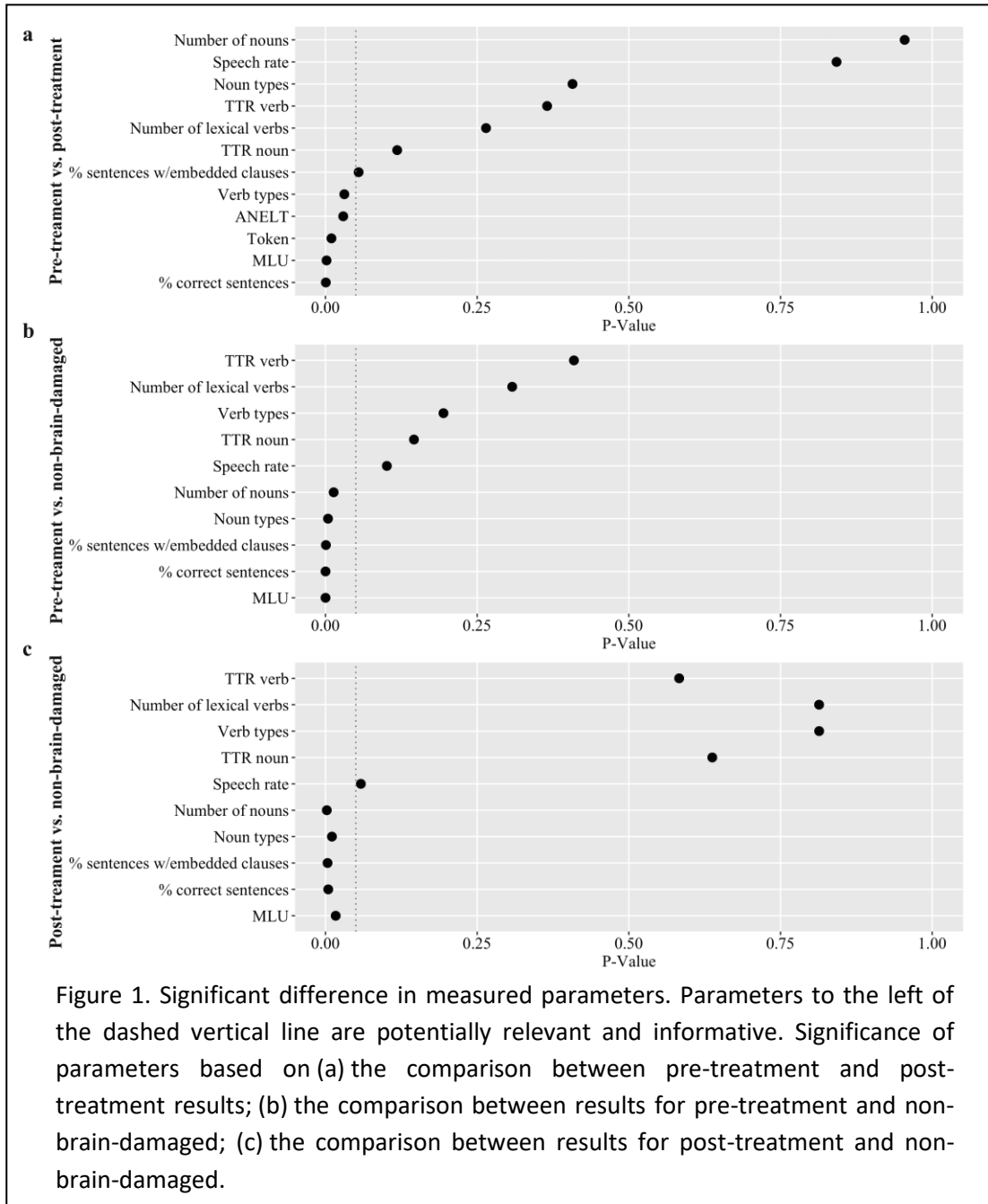
### *Linguistic assessment*

For every participant, language was assessed four times. Two baseline tests (T1 - T2) four weeks apart were followed by six weeks of the therapy. The PWAs were tested directly after treatment (T3) and six weeks later (T4).

The severity of aphasia in participants was examined with the Token Test via App (Akinina et al., 2015). A 200-word sample was elicited from every participant by interview with open-ended questions referring to the present and the past. The interview was audio-recorded; the selected sample was orthographically transcribed. The transcription was used to quantify speech rate (words per minute), mean length of utterance (MLU) in words, percentage of correct sentences, percentage of sentences with embedded clauses, numbers of nouns and verbs types, numbers of produced nouns and lexical verbs (tokens), type-token ratios for nouns and verbs. The results of spontaneous speech analysis were also compared to the non-brain-damaged controls (NBD; n=5). The Amsterdam-Nijmegen Everyday Language Test (ANELT) (Blomert et al., 1994; Russian adaptation: Akinina, 2017) was used to establish verbal communicative abilities in PWA.

# Results

When compared to NBD, PWA demonstrated significantly lower values in MLU, percentage of correct sentences, percentage of sentences with embedded clauses, number of noun types, and overall number of produced nouns both for pre- and post-treatment conditions (see Figure 1b, c).



No significant difference was observed between two baseline tests (T1 and T2). Post-treatment (T3), an improvement was observed on the Token Test and the ANELT. In spontaneous speech, a significant difference was found in MLU, percentage of correct sentences, and number of verb types (see Figure 1a).

# Discussion

This study demonstrates that communicative abilities task and specific spontaneous speech parameters are sensitive to the treatment-induced changes in chronic aphasia. Despite the improvement on several parameters after the treatment, PWA still preserved spontaneous speech deficits, and did not enter the normal range in all the parameters that differed from NBD before the treatment. Therefore, the spontaneous speech analysis may be also used to distinguish speakers with aphasia from the healthy population. Although the number of verb types for PWA before the treatment was not lower than in NBDs, PWA demonstrated significant increase in this parameter after the treatment, which may be due to the training effect.

Measurements of communicative abilities and spontaneous speech analysis should be considered as valuable evaluation tools for recovery in aphasia, but further investigation on different aphasia types, populations and treatments is essential.

## References

- Akinina, Yu., Dragoy, O., Raaijmakers, S., Satoer, D. & Bastiaanse, R. (2015). The e-Token Test: Russian version. Groningen (NL): Groningen Expert Center for Language and Communication Disorders.
- Akinina, Yu. (2017). Amsterdam-Nijmegen Everyday Language Test. Russian version. Unpublished manuscript.
- Blomert, L., Kean, M. L., Koster, C., Schokker, J. (1994). Amsterdam — Nijmegen everyday language test : construction, reliability and validity. *Aphasiology*, *8*, 381–407.
- Grande, M., Hussmann, K., Bay, E., Christoph, S., Piefke, M., Willems, K., Huber, W. (2008). Basic parameters of spontaneous speech as a sensitive method for measuring change during the course of aphasia. *International Journal of Language & Communication Disorders*, *43*, 408–426.
- Hilari, K., Needle, J. J., Harrison, K. L. (2012). What Are the Important Factors in Health-Related Quality of Life for People With Aphasia? A Systematic Review. *Archives of Physical Medicine and Rehabilitation*, *93*, 86–95.
- Spaccavento, S., Craca, A., Del Prete, M., Falcone, R., Colucci, A., Di Palma, A., & Loverre, A. (2014). Quality of life measurement and outcome in aphasia. *Neuropsychiatric Disease and Treatment*, *10*, 27–37.