

# A new Russian Aphasia Test: development and standardization of single-word comprehension subtests.

Kuptsova S.V.<sup>1,2</sup>, Soloukhina O.A.<sup>2</sup>, Dragoy O.V.<sup>2</sup>, Akinina Y.S.<sup>2</sup>, Akhutina T.V.<sup>3</sup>, Ivanova M.V.<sup>2</sup>

<sup>1</sup>Center for Speech Pathology and Neurorehabilitation (Russia), <sup>2</sup>National Research University Higher School of Economics (Russia),  
<sup>3</sup>Lomonosov Moscow State University (Russia)

## Background

- **Aphasia** is a complex disorder of developed language ability (production and comprehension of oral and written language), encompassing disturbance of phonemic, morphological, lexical-semantic and syntactic levels of language while articulation, primary hearing and vision are intact (Luria, 2000; Homskey, 2003)).
- The lack of the modern quantitative neuropsychological tests for the assessment of language in Russia explains the need of developing specialized test batteries that would incorporate both neuropsychological and psychometric traditions, be based on contemporary models of language processing and allow to specify the type of linguistic deficits in individuals with aphasia.

## Methods

### Participants.

Thirty healthy right-handed individuals without neurological and psychiatric disorders (mean age: 44,2; 13 men). Forty five right-handed individuals with aphasia (mean age: 45,4; 27 men; 25 non-fluent and 20 fluent). Thirty healthy individuals (mean age: 47,5; 16 men) and thirty individuals with aphasia (mean age: 51,6; 18 men; 18 non-fluent and 12 fluent) completed the subtest for noun comprehension. 30 individuals with aphasia performed both tasks. All participants were native speakers of Russian.

### Tests (all verbal material was presented in Russian):

The task was to listen to a spoken word and match it to an appropriate picture in an array of four pictures (each picture contained a target, a semantic distractor, a phonological distractor, and an irrelevant distractor)

#### 1. Verb comprehension subtest

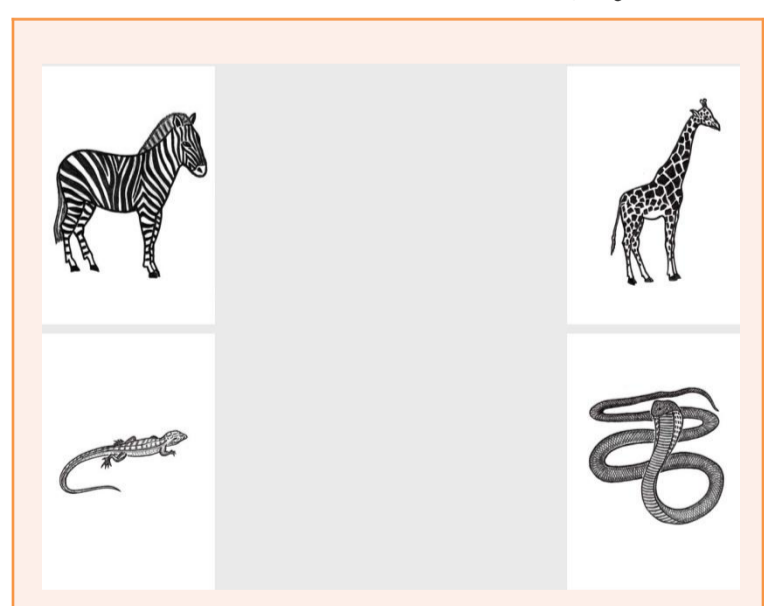
(verbs were taken from the Russian database "Verb and action" (Akinina et al., 2014\*; <http://neuroling.ru/ru/db.htm>) containing 375 verbs and corresponding pictures of actions and information on the critical psycholinguistic parameters. 197 verbs were selected for this subtest)



Target stimulus	tsvesti (to blossom)
Phonological distractor	gresti (to row)
Semantic distractor	sazhat' (to plant)
Irrelevant distractor	vicherpyvat' (to bail out)

#### 2. Noun comprehension subtest

(nouns were taken from the Russian database "Noun and object" (<http://www.nounobject.ru>) containing 416 nouns and corresponding object pictures and similar to the verbs psycholinguistic parameters. 217 nouns were selected)



Target stimulus	zebra (zebra)
Phonological distractor	kobra (cobra)
Semantic distractor	zhiraf (giraffe)
Irrelevant distractor	yasheritsa (lizard)

**Phonological distractor** differing from the target word by 1-2 phonemes (possible alternations included substitution of one sound for another, adding phonemes without removal, substitution of two phonemes for two in one place, substitution one phoneme for two in one place)

**Semantic distractor** - actions and objects close in meaning but not synonymous to the target words

**Irrelevant distractor** - not associated with the target word, but semantically related to the phonological distractor

*Criteria for choosing words from database:*

- the difference in frequency between the target word and the distractors did not exceed 100 ipm.

- no common nominations for distractors and target words were allowed (i.e. all stimulus pictures which could be named both by the target and distractor words were excluded).

## Aim of the study

Developing and standardization of the subtests for comprehension of single words (verbs and nouns) for the novel standardized aphasia test – the Russian Aphasia Test (RAT).

## Results

Non-parametric Mann-Whitney test was used for comparison between groups. The aphasia and the control group did not differ significantly in age ( $Z = -1,273$ ,  $p = 0, 203$ ).

Healthy participants performed significantly better than individuals with aphasia in the verb and noun comprehension subtests (verb:  $Z = -7,07$ ,  $p < 0,001$ ; norm group: mean correct answers = 65,6, SD = 0,56; range: 64 – 66; patients: mean correct answers = 57, SD = 7,97; range: 21 – 66; noun:  $Z = -5,47$ ,  $p < 0,001$ ; norm - 100% correct answers; patients: mean correct answers = 61,63, SD = 8,7; range: 23 – 67).

Both individuals with and without aphasia performed significantly better on noun comprehension compared to verb comprehension (patients:  $Z = -9,06$ ,  $p < 0,001$ ; norm:  $Z = -3,12$ ,  $p = 0,002$ ).

No significant differences between individuals with fluent and non-fluent aphasia were found (comprehension of verbs:  $Z = -1,576$ ,  $p = 0,115$ ; comprehension of nouns:  $Z = -1,205$ ,  $p = 0,228$ ).

## Discussion

➤ Significant differences between individuals with and without aphasia in performing both tasks, allow to conclude that the selected sets of stimuli for both subtests identify deficits in single word comprehension of actions and objects.

➤ The trials in which mistakes were made in the group of healthy participants are not valid for the examination of individuals with aphasia. These trials were excluded from the final set.

➤ The trials in which the individuals with aphasia did not make any mistakes were excluded from the final set due to lack of their sensitivity to aphasia deficits.

➤ The trials in which participants with aphasia made mistakes, in contrast, demonstrate sensitivity to difficulties in the comprehension of verbs and nouns and help identify semantic and phonological disorders.

➤ The better comprehension of nouns than of verbs in both groups probably is a consequence of a more complex structure of verbs.

**Based on the current results final sets of stimuli were selected. The final verb and noun sets of stimuli were balanced on critical psycholinguistic parameters. This resulted in the final set of 30 diagnostic trails for each subtest that will be included in the final version of the RAT.**