

## Background

The Aphasia Rapid Test (ART; Azuar et al., 2013) is a bedside test allowing to rate aphasia severity in the acute stroke period. This test is developed as a 26-point scale estimating the severity of both speech comprehension and production in less than 5 minutes. Previously, ART was used in English and French clinical practice (Azuar et al., 2013). In Russian, there has been no analogous bedside screening scale for acute hospital units. Tests which were used before (Wasserman et al., 1987) are detailed, but time-consuming and effortful for individuals in the first days post-stroke. ART is a reliable measure allowing to identify language and speech disorders (aphasia, dysarthria or apraxia of speech).

## Study 1: Validation

### Participants

16 people with chronic speech and/or language disorders (10 men and 6 women, mean age (±SD) - 53,6 ± 9,2, mean time post onset - 23,7 months, range: 2 to 24 months) and 16 healthy controls (5 men and 11 women, mean age (±SD) was 56,2 ± 9,2 years

### Materials and Procedure

Participants were tested individually in a quiet room by a linguist first with the ART and an experimenter recorded the results in the paper protocol. After that, participants were tested with the i-Pad version of the Token Test (Bastiaanse et al., 2015; Russian version: Akinina et al., 2015) for estimating the validity of the ART. Token Test - one of the most widespread tests for detecting aphasia and estimating its severity. The Token Test is released as an application for iPad and consists of 36 probes. A participant is presented with circles and squares varying in size and color. At the same time, the instructions are aurally presented, and (s)he has to touch figures or manipulate them according to the instructions. The responses are captured and calculated automatically.

### Results

In the control group all participants performed ART at ceiling and scored 0 points. The median Token Test value was 33,5 (range: 29,5 - 35), the mean (±SD) Token Test value was 32,5 (±1,7). Results of the Pearson correlation indicated that there was a significant negative association between the performance on the ART and on the Token Test ( $r = -.830$ ,  $p = .000$ ). That means that the highest score on the ART reflects the presence of the more severe speech and/or language disorder.

	TT (aphasia, <29)	TT (no aphasia, >=29)
ART (+, >0)	A True positive (14)	B False positive (2)
ART (-, =0)	C False negative (0)	D True negative (16)

Sensitivity A/(A+C)	1
Specificity D/(B+D)	0,89
Positive predictive value A/(A+B)	0,875
Negative predictive value D/(C+D)	1
Accuracy (A+D)/(A+B+C+D)	0,94

### Discussion

The validation study shows that the Russian version of Aphasia Rapid Test is highly specific, sensitive, accurate and valid. That is why it could be used in acute clinical population.

## Study 2: Proof of Principle

### Participants

The adapted version of ART was tested in Russian speaking clinical population in the acute stroke period (N=49, 20 females, mean age (±SD) - 69 ± 11,2, range 40-88) and in a control group of non-brain-damaged Russian speakers (N=50, mean age (±SD) - 42,6 ± 16,1, range 18-79). To test construct validity, the severity of brain-damaged individuals' language and speech disorders was scored by professional speech and language therapist (SLT) (ranged from 0-6). All non-brain-damaged individuals and 8 out of 49 people with aphasia (due to disabilities of the resting 41 participants) were also tested with the iPad version of the Token Test

### Materials and Procedure

Participants in the clinical group were tested by linguist with ART and then examined by professional SLT. A linguist also tested participants with the Token Test. People in the control group were friends and relatives of the experimenters and volunteered for the Study.

### Results

The control group performed on ART at ceiling, the average result on Token Test was 34.9 points (S = 1.25, range 32-36 points, 97% of correct answers). The average result on ART in clinical group was 6.08 points (S = 5.26, range 0-21 points), 3.14 on Wasserman scale (S = 2.03, range 0-6) and 24.6 on Token Test (S = 10.8, range 0-34). Performance of people with aphasia on ART positively correlated with the results of Wasserman scale ( $p = 0.55$ ,  $p = 0.001$ ) and with the results of Token Test in 8 cases ( $p = 0.97$ ,  $p = 0.001$ ).

### Discussion

The results showed that the Russian version of the ART is a valid and sensitive screening test for detecting and monitoring early aphasic changes in the acute stroke period. It could be recommended for integration into Russian clinical practice in acute hospital units for quick speech and language assessment.

### 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.
- Azuar, C., Leger, A., Arbizu, C., Henry-Amar, F., Chomel-Guillaume, S., & Samson, Y. (2013). The aphasia rapid test: An NIHSS-like aphasia test. *Journal of Neurology*, 260, 2110-2117. doi:10.1007/s00415-013-6943-x
- Bastiaanse, R., Raaijmakers, S., Satoer, D., & Visch-Brink, E. (2015). The Multilingual Token Test. *Aphasiology*, 30(4), 508-508. doi:10.1080/02687038.2015.1121710
- Wasserman, L.I., Dorofeeva, S.A., Meerson Ya. A., Traugott N. N. (1987). Standartizirovannyj nabor diagnosticheskikh neiropsikhologicheskikh metodik [Standardized set of diagnostic neuropsychological assessments]. Leningrad: Metodicheskie rekomendatsii.

## Design of the Aphasia Rapid Test

Instructions	Score
1a. Execution of simple orders: «Close and open your eyes» «Give me your left hand»	0 = performs both tasks correctly. 1 = performs one task correctly. 2 = performs neither task correctly.
1b. Execution of a complex order: «Put your left hand on your right ear»	0 = performs the task in less than 10 s. 1 = performs the task in more than 10 s or requires the order to be repeated. 2 = performs the task partially: moves the hand across the median line or performs the task on the wrong side. 3 = does not perform the task: does not move the hand across the median line or does not move at all.
2. Repetition of words: 2a. «kit» 'whale' 2b. «groza» 'thunderstorm' 2c. «vorotnik» 'collar'	Each word scores from 0 to 2 (total 0-6), as follows: 0 = normal repetition. 1 = abnormal repetition but the word is correct and recognizable by the examiner *. 2 = non-repetition or unrecognizable word *. *Note: Phonemic, apraxic or pronunciation errors can be scored 1 if the word is recognizable by the examiner, or 2 if the word is unrecognizable.
3. Repetition of a sentence: «Mama kupila dva zelenykh yabloka» 'Mother bought two green apples'	0 = normal repetition. 1 = abnormal repetition but the sentence is recognizable by the examiner *. 2 = non-repetition or unrecognizable sentence*. *Note: Phonemic, apraxic or pronunciation errors can be scored 1 if the sentence is recognizable by the examiner, or 2 if the sentence is unrecognizable.
4. Object naming: 4a. «myach» 'ball' 4b. «zvezda» 'star' 4c. «kompas» 'compass'	0 = normal naming. 1 = abnormal naming but the word is correct and recognizable by the examiner.* 2 = wrong naming or unrecognizable word. * *Note: Phonemic, apraxic or pronunciation errors can be scored 1 if the word is recognizable by the examiner. An unrecognizable word or lexical error must be scored 2.
5. Scoring of dysarthria :	0 = normal. 1 = minor dysarthria. 2 = moderate dysarthria: patient can be understood. 3 = severe dysarthria: unintelligible speech.
6. Verbal semantic fluency task: «Name as many animals as you can in one minute.»	0 = more than fifteen words. 1 = between eleven and fifteen words. 2 = between six and ten words. 3 = between three and five words. 4 = between zero and two words.
Total Score	/26

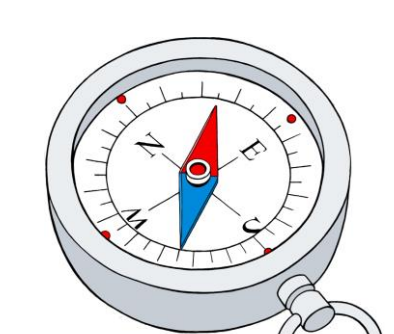
The Russian adaptation of the ART was made using an original set of stimuli relevant for Russian. As in English version, the first task examines patients' ability to follow two simple and one complex instructions. In the second task, patients are asked to repeat three single nouns with different numbers of articulatory switches (*kit* 'whale' - no switch, *groza* 'thunderstorm' - 1 switch, *vorotnik* 'collar' - 3 switches). The third task examines repetition of one simple sentence containing a subject, a verb in past tense and an object with two prenominal modifiers. The fourth task tests the naming of three objects presented in the pictures. The final task is 1-minute semantic fluency task (Azuar et al., 2013): recalling as many animals as it is possible. Dysarthria severity is also assessed. All tasks are scored in the same manner as in the original ART (26 points maximum).



Myach 'ball'



Zvezda 'star'



Kompas 'compass'

## Study 2: Results

