

Aphasia Rapid Test: Adaptation for Russian

¹National Research University Higher School of Economics (Moscow, Russia)

²Municipal Clinical Hospital 31 (Moscow, Russia)

³University of Groningen

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).

Design of the Aphasia Rapid Test

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).

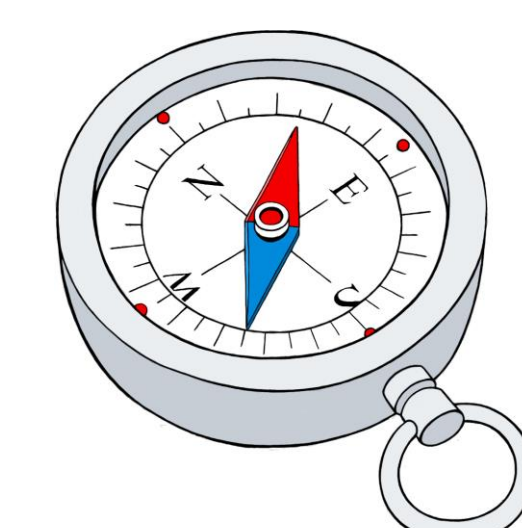
| Instructions | Score |
|--------------------------------------------------------------------------------------------------------|----------------------|
| 1a. Execution of simple orders: «Close and open your eyes» «Give me your left hand» | 0 - 2 |
| 1b. Execution of a complex order: «Put your left hand on your right ear» | 0 - 3 |
| 2. Repetition of words: 2a. «kit» 'whale' 2b. «groza» 'thunderstorm' 2c. «vorotnik» 'collar' | 0 - 2. (for each) |
| 3. Repetition of a sentence: «Mama kupila dva zelenykh yabloka» 'Mother bought two green apples' | 0 - 2 |
| 4. Object naming: 4a. «myach» 'ball' 4b. «zvezda» 'star' 4c. «kompas» 'compass' | 0 - 2 (for each) |
| 5. Scoring of dysarthria | 0 - 3 |
| 6. Verbal semantic fluency task: «Name as many animals as you can in one minute» | 0 - 4 |
| Total Score | /26 |



Myach 'ball'



Zvezda 'star'



Kompas 'compass'

Study 1: Validation

Participants and Procedure

For measuring the sensitivity, specificity, accuracy and validity of the test, 16 people with chronic speech and/or language disorders and 16 non-brain-damaged individuals were tested with the ART and the Token Test (Bastiaanse et al., 2016; Russian version: Akinina et al., 2015). Participants were tested individually by a clinical linguist in a quiet place and performed the tests consecutively.

For measuring inter-rater reliability, 16 aphasic participants were chosen randomly and scored independently by two clinical linguists. Both experimenters were in the room where the participant was tested and wrote down their scores on their own score form. For measuring test-retest reliability and inter-item consistency 16 people with chronic aphasia were tested twice with the interval from 14 to 37 days and people in acute stroke with the interval from 4 to 6 days (at the second and the last days of their stay in the hospital).

Study 1: Validation

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 (\pm SD) Token Test value was 32,5 (\pm 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.

Test-retest reliability was calculated on the basis of results of participants in two points of testing (T1 and T2) people with chronic speech and/or language disorders. There is a strong correlation ($r = .882$) between the results in T1 (range: 1-15, mean - 6,69 \pm 4,5) and T2 (range: 1-13, mean - 5,9 \pm 4,8). The results of Student's t-test show that there is no significant difference between performance in T1 and T2 ($r = .882$, $p = .247$).

Inter-item reliability in T1 in the group of people in acute stroke period is also high (Cronbach's $\alpha = .768$).

Inter-rater reliability was measured ($kw = .778$, $p = .362$), and the results mean that there is no significant difference between the scores of raters 1 and 2.

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.

| | 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 |

Study 2: Proof of Principle

Participants

Russian speaking clinical population in the acute stroke period (N=49, 20 females, mean age (\pm SD) - 69 \pm 11,2, range 40-88) and a control group of non-brain-damaged Russian speakers (N=50, mean age (\pm SD) - 42,6 \pm 16,1, range 18-79). To test the severity of brain-damaged individuals' language and speech disorders all participants were 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

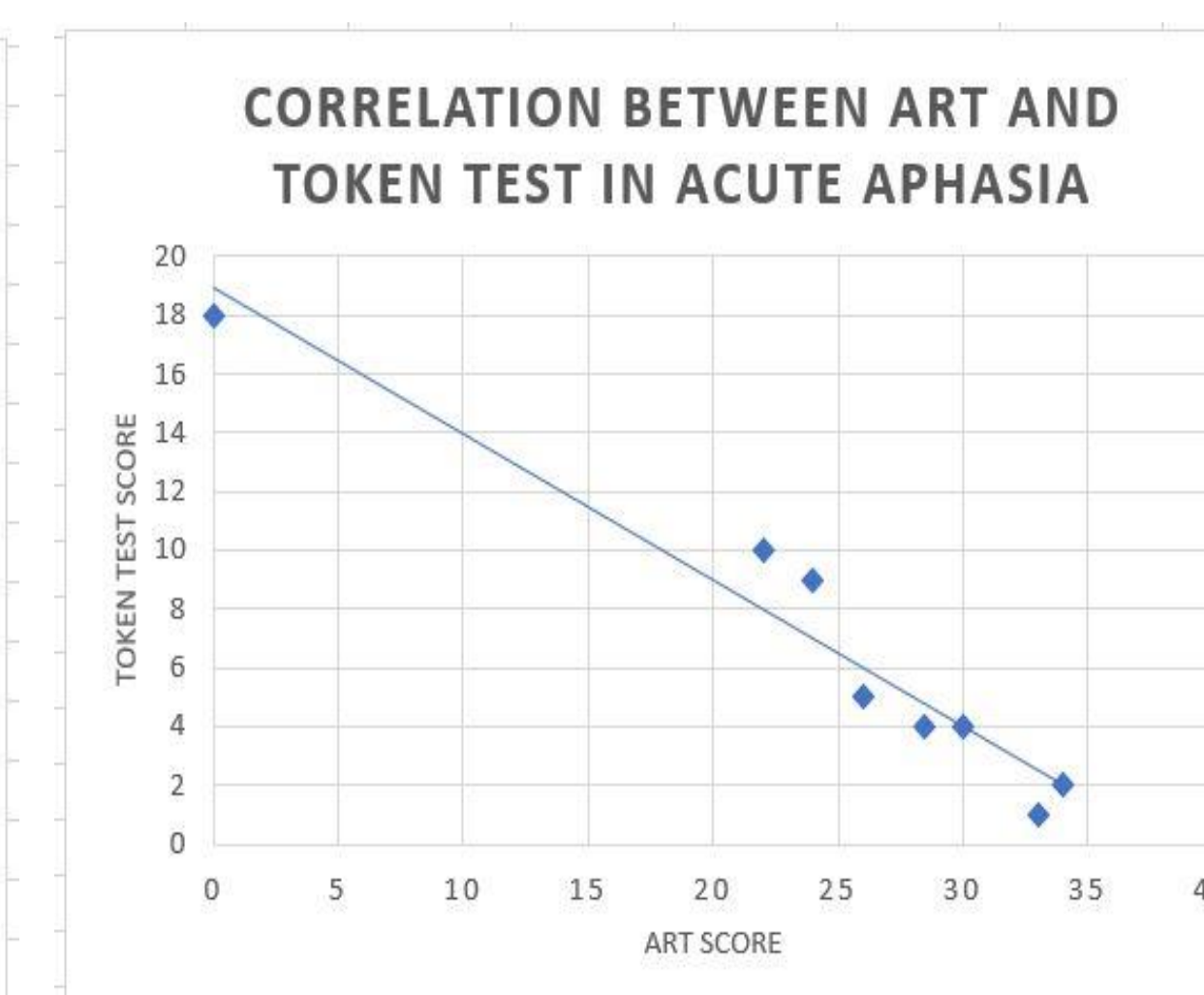
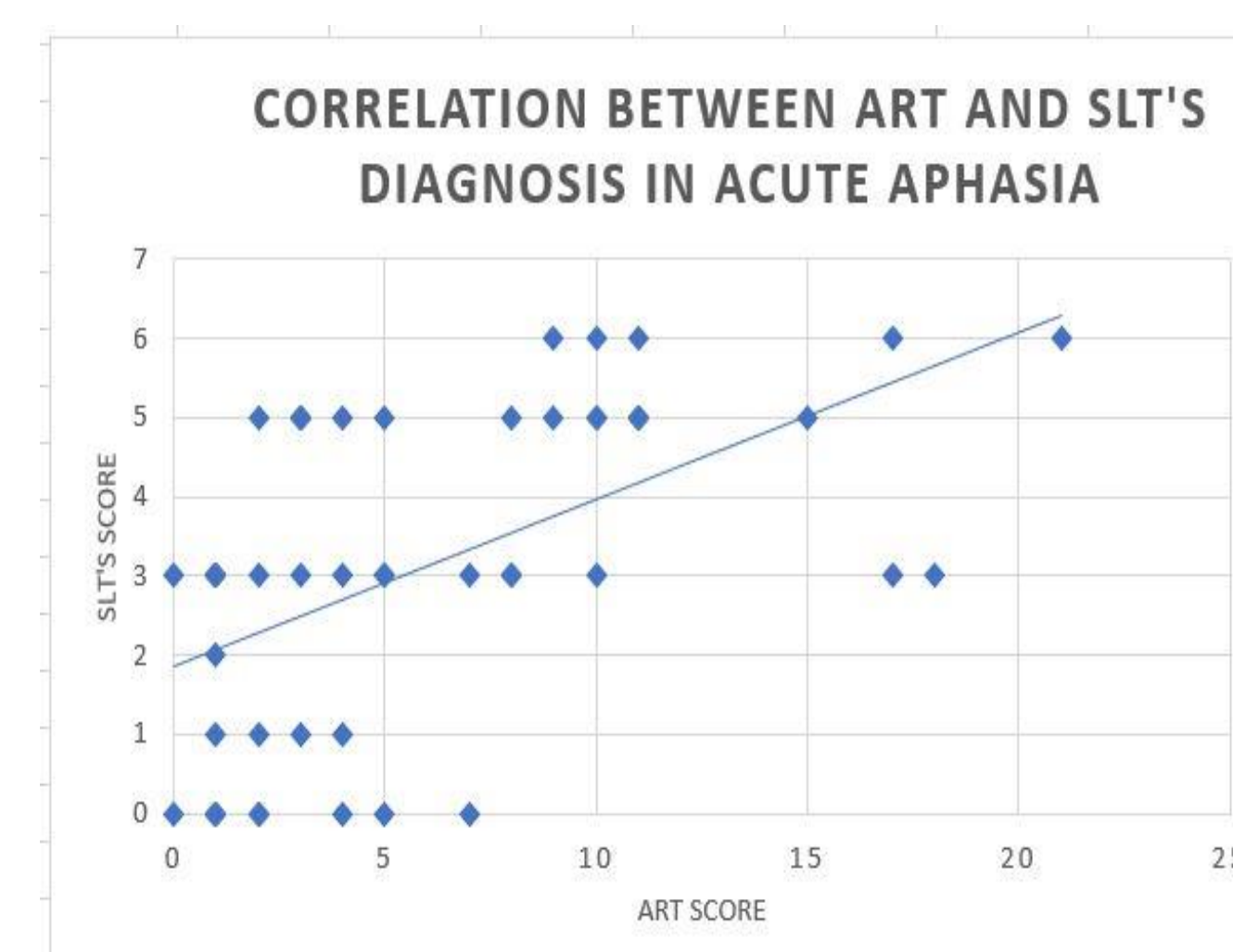
Participants in the clinical group were tested by linguist with ART and then examined by professional SLT. A linguist also tested participants with the Token Test. People in the control group were friends and relatives of the experimenters and volunteered for the Study. All participants signed informed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

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 ($\rho = 0.55$, $p = 0.001$) and with the results of Token Test in 8 cases ($\rho = 0.97$, $p = 0.001$).

Discussion

The results show that Wasserman's scale which is widely used in Russian clinics has a low correlation with the "golden standard" Token Test. It is possible because Wasserman's scale is a very complex and detailed scale and that is why not always relevant for using in acute hospital units. Unfortunately, not all participants could perform Token Test, because performing iPad version of the test was also complicated for people in acute stroke period. However, in 8 cases results of the Token Test and the ART are highly correlated. That means that the Aphasia Rapid test is more suitable for using in acute hospital units



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 neiropsichologicheskikh metodik [Standardized set of diagnostic neuropsychological assessments]. Leningrad: Metodicheskie rekomendatsii.