STANDARDIZING THE RUSSIAN APHASIA TEST: NORMATIVE DATA OF HEALTHY CONTROLS AND PATIENTS WITH APHASIA.

Ivanova M.V.[1, 2], Dragoy O.[2, 3], Akinina Yu.S.[2,4], Soloukhina O.A.[2], Iskra E.V.[2,5], Khudyakova M.V.[2], Stupina, E.A. [2], Buivolova, O.V. [2], Akhutina T.V.[6]

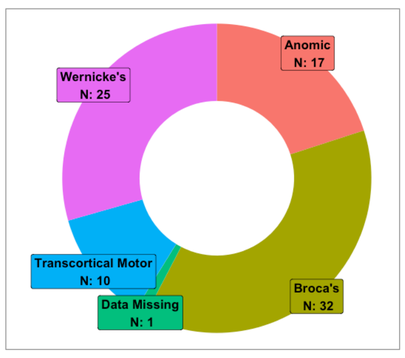
[1] UC Berkeley, USA; [2] National Research University Higher School of Economics, Russia; [3] Federal Center for Cerebrovascular Pathology and Stroke, Russia; [4] University of Groningen, Groningen, The Netherlands;[5] Center for Speech Pathology and Neurorehabilitation, Russia; [6] Lomonosov Moscow State University, Russia

Russian Aphasia Test (RAT)

- **Addresses the lack of quantitative, standardized, psychometrically valid and reliable language assessment tests in Russian (world 7th language by the number of speakers).**
  - Integrates neuropsychological and psychometric traditions.
  - Includes two language domains: auditory comprehension & oral production (in the future reading & writing will be added).
  - Assesses specific levels of linguistic processing in each domain.
  - Aims to specify the type and severity of linguistic deficits in individuals with different aphasia profiles.
- **First comprehensive aphasia language test to be fully automatized:**
  - All visual and auditory stimuli presented on a tablet;
  - Automatic scoring of comprehension subtest (with RT recorded);
  - Easy scoring of oral production subtests;
  - Summary report generation from the tablet.

Subtests

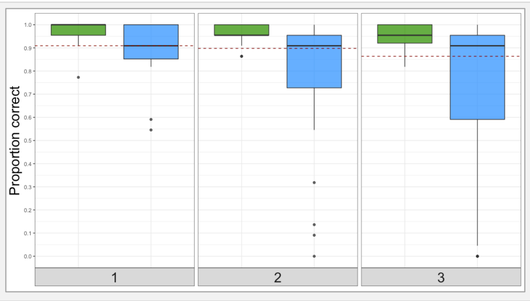
Language level	Auditory comprehension	Oral production
• **Phonological**	• Nonword discrimination	• Nonword repetition
• **Lexical**	• Lexical decision	• Word repetition
• **Lexical-semantic**	• Single word comprehension	• Naming
• **Syntactic**	• Sentence comprehension	• Sentence production & repetition
• **Discourse**	• Story comprehension	• Picture description



Standardization sample

		n	Age	Sex	Time post-onset
Control	no neurological history	107	50.1 (19 – 86)	29 M 78 F	-
Aphasia	various types and severity of aphasia	85	57.6 (25 – 80)	59 M 26 F	34.7 months (1 – 249)

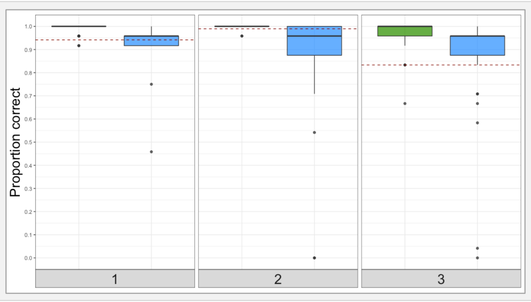
AUDITORY COMPREHENSION



Nonword discrimination

Judgment of whether pairs of nonwords are different or the same (n=24).

- Phonological features (e.g., manner and place of articulation, VOT, palatalization);
- Syllabic structure (CV, CVC, CCVC, CVCC, CCVCC);
- Word position (onset, offset).



Lexical decision

Classify stimuli as word or nonword (n=24).

- Lexical frequency: high and low;
- Word length: two and three syllable;
- Degree of similarity of nonwords to real words.

Group
control
aphasia

Age cohorts
1: 18 – 39
2: 40 – 59
3: 60 and above

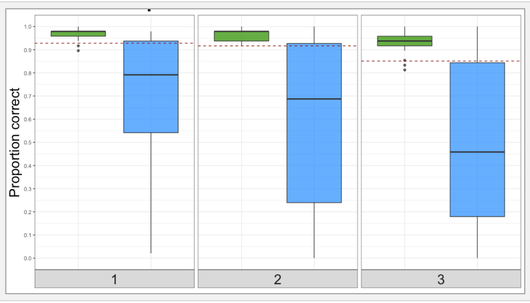
Cutoff
-- 5th percentile

ORAL PRODUCTION

Nonword repetition

Repetition of nonwords (n=24).

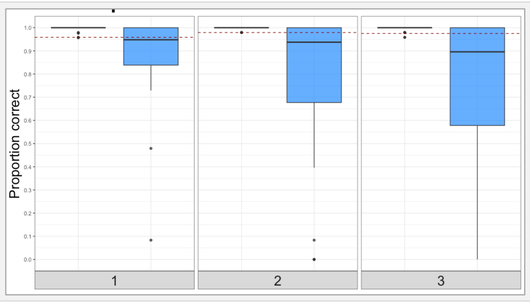
- Word length: one, three and five syllable words;
- Degree of similarity of nonwords to real words;
- Number of articulatory switches.



Word repetition

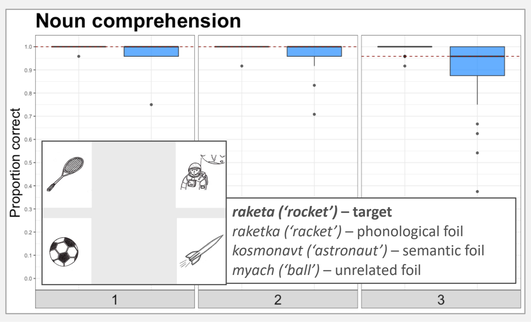
Repetition of words (n=24).

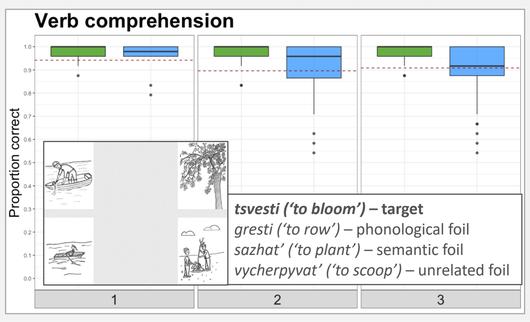
- Lexical frequency: high and low;
- Word length: one, three and five syllable words;
- Number of articulatory switches.



Single word comprehension - word to picture matching for nouns (n=24) and verbs (n=24).

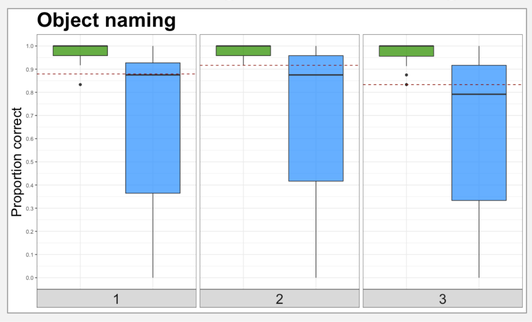
- Visual array of 4 pictures (target + phonological , semantic, and unrelated foils).
- Nouns and verbs equated on all relevant psychometric properties with word frequency manipulated.

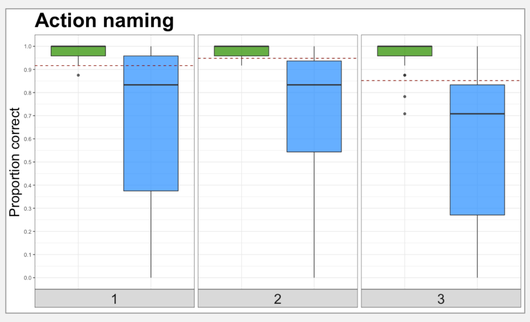


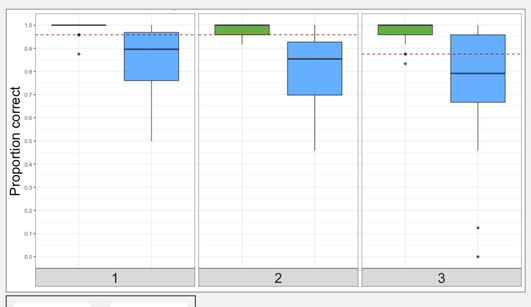


Naming - picture naming of objects (n=24) and actions (n=24).

- Target nouns and verbs equated on all relevant psychometric properties with word frequency manipulated.
- Also equated to target words in the "Single word comprehension" subtest.







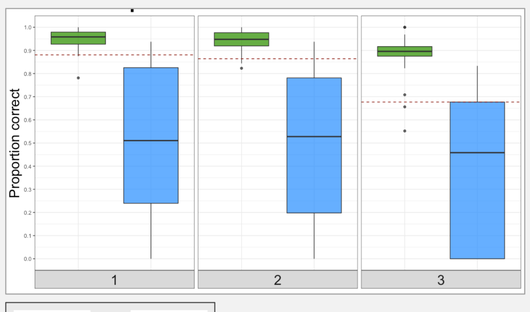
Where is grandpa, who is tickled by the boy? (Object relative clause, transitive, reversible)

Sentence comprehension - sentence to picture matching for various syntactic constructions (n=24).

- Each visual array consists of 2 pictures: target and syntactic foil;
- Short sentences, no additional descriptors, high-frequency lexical items used;
- Intransitive and transitive verbs;
- Reversible and non-reversible sentences;
- Syntactic structures include SVO, OVS, subject relative, object relative, prepositional phrases.

Sentence production – sentence production using a syntactic priming paradigm (n=24).

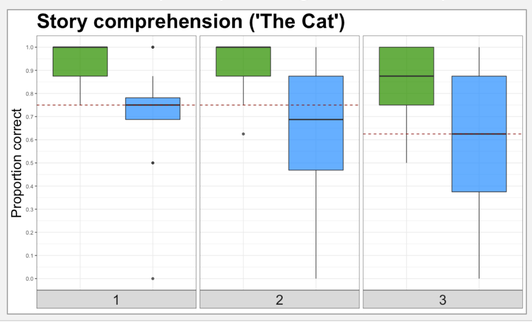
- Each visual array consists of 2 pictures – one prime and one target (depicting different actions);
- Prime sentences: short, no additional descriptors, high-frequency lexical items used;
- Intransitive and transitive verbs;
- Reversible and non-reversible sentences;
- Syntactic structures identical to the "Sentence comprehension" subtest and include SVO, OVS, subject relative, object relative, prepositional phrases.

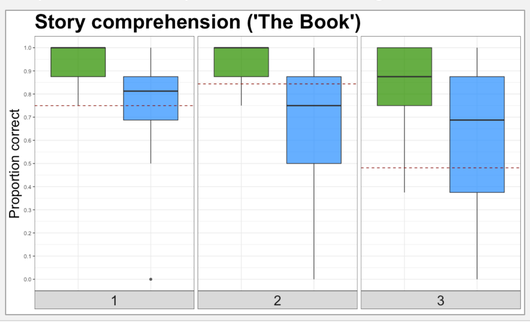


Prime – *The bride is driven by the groom.*
Target – *Grandfather is fed by the girl.*
(Simple, non-canonical OVS, transitive, reversible)

Story comprehension - comprehension of two orally presented stories: 'The Cat' and 'The Book'.

- Indexed by response accuracy to 16 yes-no questions on explicit/implicit and main/detail story content.
- Lexical complexity: 1-3rd grade level. Syntactic complexity: 1.3 clauses per sentence. Length: 22 sentences.



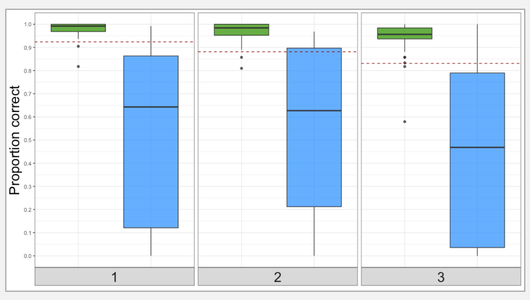


Sentence repetition

Repetition of sentences (n=12).

- Sentences of varying length (3-4 words vs. 6-9 words) and lexical complexity (with high vs. low frequency words);
- 3 sentences of each type.

Picture description – *analysis in progress*

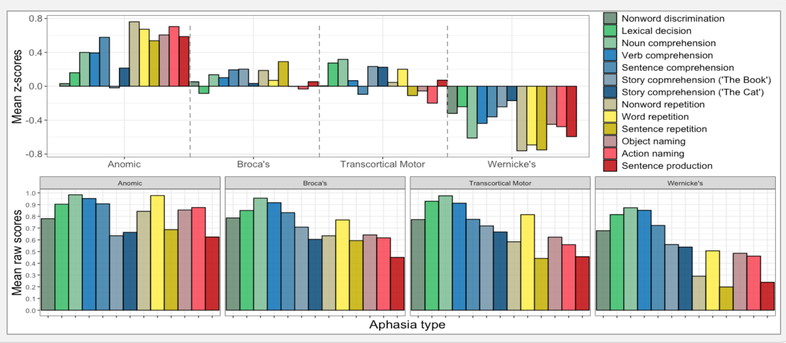


The car is again not working. (Short, high-frequency)

The capricious baroness critiques the intricate floral ornament. (Long, low-frequency)

APHASIA TYPE PROFILES

- Patients were classified by certified SLPs based on clinical observations and performance on non-standardized assessments.
- Based on the primary type, patients with mixed fluency not included.
- Z-scores based on patient group performance, irrespective of the age group.



SUMMARY & FUTURE DIRECTIONS

- The control group showed almost perfect performance on the RAT, with most variability observed on the language production subtests (particularly, sentence production).
  - Accuracy declined with age in healthy controls → Important to have age-specific cutoffs.
- The aphasia group scored significantly lower than the control group on all subtests, showing that all RAT subtests were sensitive to aphasic language deficits.
- **To be addressed:**
  - Determination of optimal aphasia cutoff using ROC analysis.
  - Establishment of internal, inter-rater and test-retest reliability.
  - Calculation of z-scores to enable between subtest and between individual comparisons.

For information/reprints: ivanova@berkeley.edu