THE TOKEN TEST APP: PERFORMANCE IN NEUROLOGICALLY HEALTHY INDIVIDUALS AND PEOPLE WITH APHASIA

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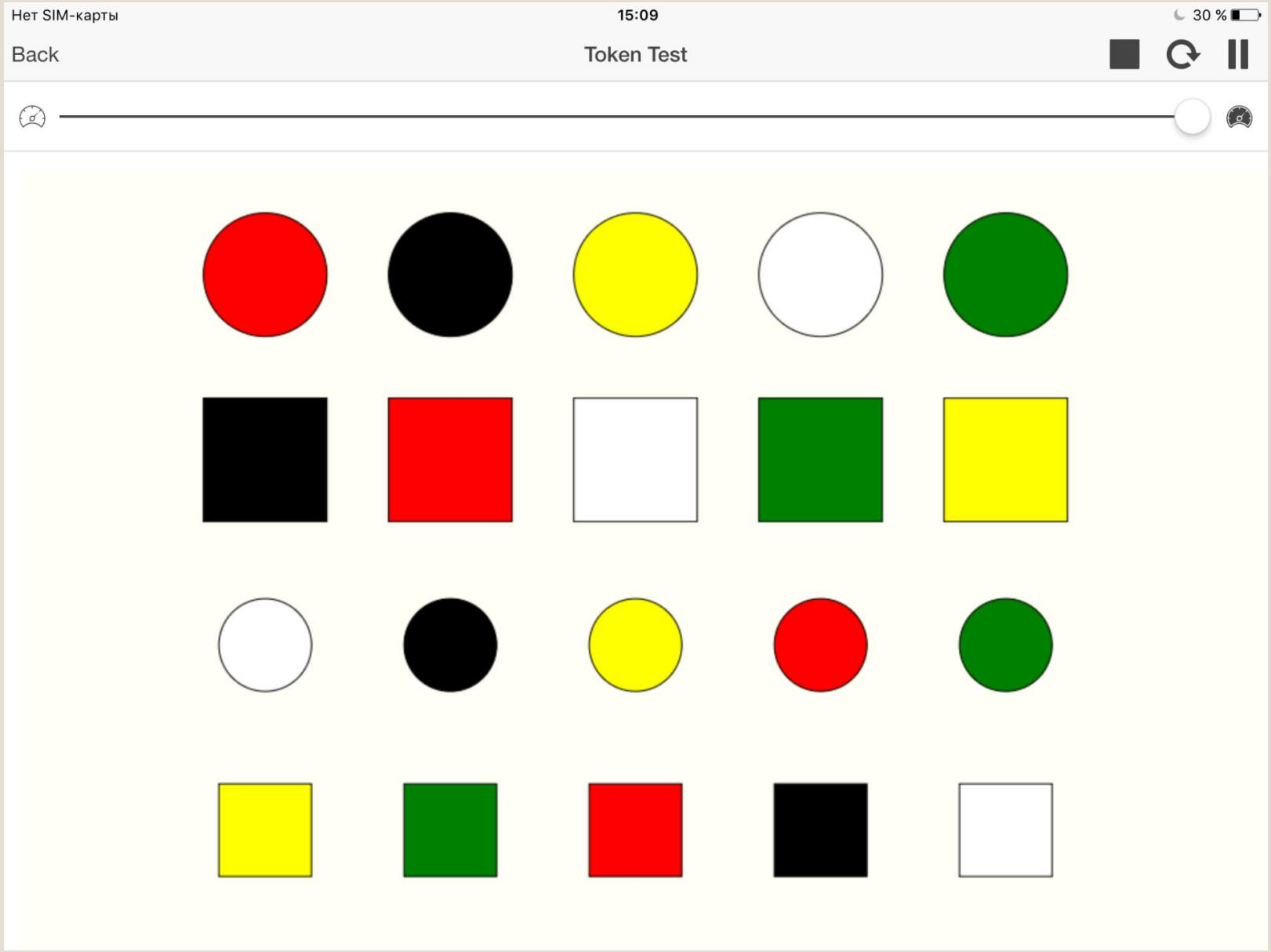
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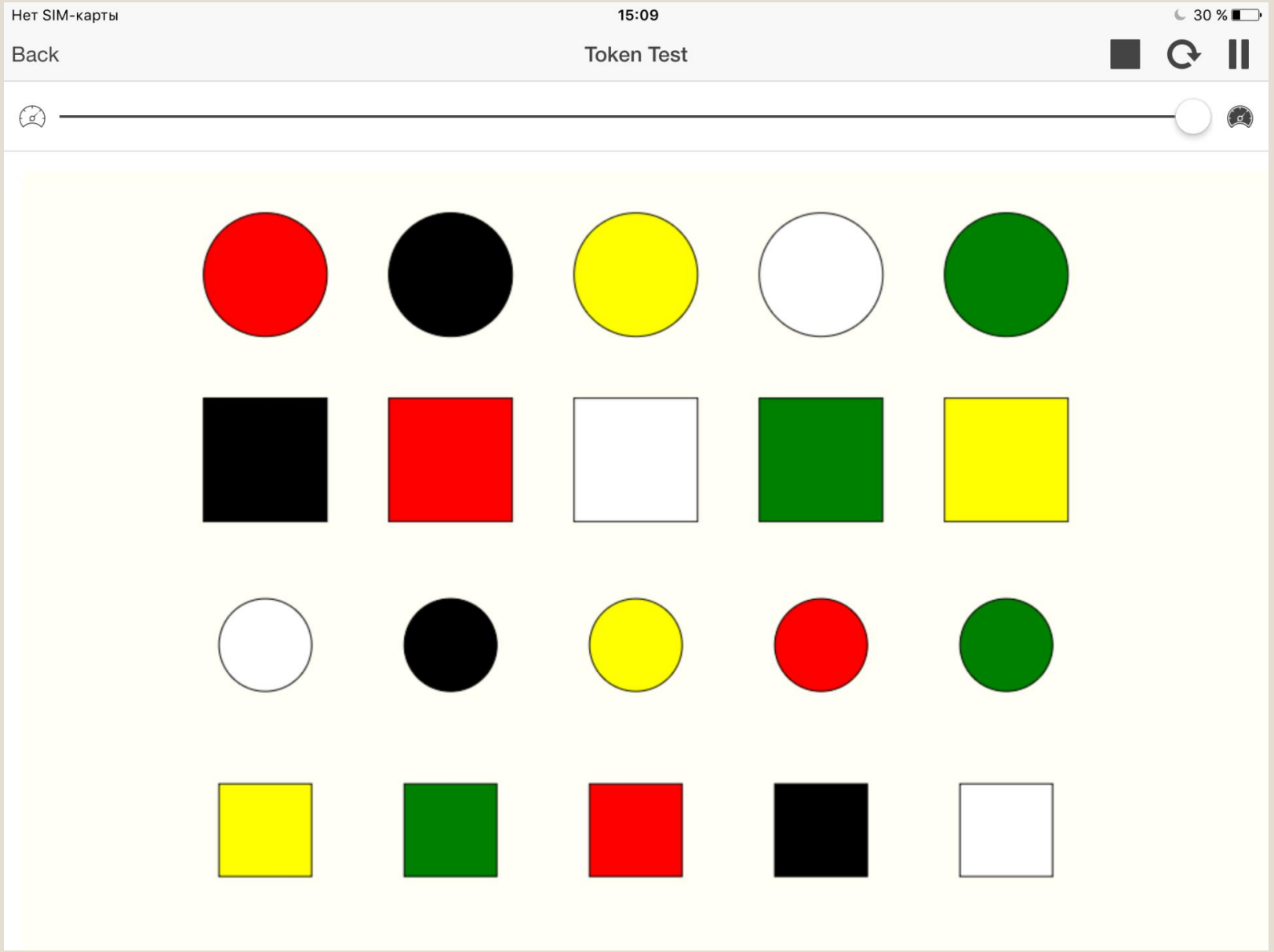
Token Test



”As you can see, there are twenty tokens here …“ (de Renzi & Faglioni, 1978)

OUTLINE

- A brief overview of the Token Test
- A brief history of the project
- The Token Test App: Second Edition

A BRIEF OVERVIEW OF THE TOKEN TEST

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- De Renzi, E. and Vignolo, L.A. (1962) The Token Test: A sensitive test to detect receptive disturbances in aphasics. Brain, 85, 665-678.
- Tokens of different shape, color and size are presented to the participant, and they follow the instructions of varying complexity
- Measures auditory comprehension
- Presence and severity of severity of aphasia in general

THE TOKEN TEST: VERSIONS

- Short forms (Boller & Vignolo, 1964; Van Harskamp &Van Dongen, 1977; Spellacy & Spreen, 1969)
- Five-item versions (Arvedson et al., 1985; Park et al., 2000)
- Concrete objects form (Martino et al., 1976)
- Revised Token Test: extended linguistic examination (McNeil & Prescott, 1978; McNeil et al., 2015)

THE TOKEN TEST: APPLICATIONS

- (Aphasia)
- Elderly population (Carvalho et al., 2009)
- Pediatric populations (e.g., Gallardo et al., 2011; Olabarrieta-Landa et al., 2017; Paquier et al., 2009)
- ADHD (Wassenberg et al., 2010)
- Huntington's disease (Azambuja et al., 2012)
- Alzheimer's disease (de Paula et al., 2012)
- Sports-related concussion (Salvatore et al., 2017)

THE TOKEN TEST: SHORTENED VERSION

- De Renzi E., Faglioni P. Normative data and screening power of a shortened version of the Token Test // Cortex. 1978. Vol. 14. P. 41-49.
- 36 instructions in six blocks
- Increasing complexity
  - Block 1: “Touch a red token”
  - Block 5: “Touch the large white circle and the little green square”
  - Block 6: ”Touch all the circles except for the green one”
- Correct response = 1, correct response after repetition = 0.5, incorrect response = 0 (max total score = 36)

A BRIEF HISTORY OF THE PROJECT

A BRIEF HISTORY OF THE PROJECT

- Advantages of computerized versions (Newton et al., 2013):
  - Reduction of human error
  - Standardization of the procedure
  - Automatic presentation and scoring
  - Time and financial efficiency
- Aim: build an electronic version of the Token Test for the tablet
  - Multiple languages
  - Available to everyone

A BRIEF HISTORY OF THE PROJECT

- First version:
  - Bastiaanse R. Raaijmakers S., Satoer D. The e-Token Test. 2015. Groningen (NL): Groningen Expert Center for Language and Communication Disorders
- A normative data collection and psychometrics study:
  - Akinina Y., Buivolova O., Iskra E., Silaeva V., Soloukhina O., Bastiaanse R. Token Test on a tablet: a case of adaptation // Poster presented at the 14th European Conference on Psychological Assessment, Lisbon, Portugal, July 5-8th 2017.
  - 77 non-brain-damaged individuals (NBD) and 25 people with aphasia (PWA)
  - Sensitivity, specificity, cutoffs, test-retest reliability, concurrent validity, item analysis

A BRIEF HISTORY OF THE PROJECT

- Positive results:
  - eTT was a sensitive test for aphasia
  - correlates well with standard clinical aphasia severity assessment
  - no practice effects in NBD
  - no effects of tablet experience in NBD

A BRIEF HISTORY OF THE PROJECT

- Positive results:
  - eTT was a sensitive test for aphasia
  - correlates well with standard clinical aphasia severity assessment
  - no practice effects in NBD
  - no effects of tablet experience in NBD
- However, the app was unusable

THE TOKEN TEST APP: SECOND EDITION

THE ETT-2: MAJOR CHANGES

- Presentation and scoring bugs fixed
- Timing
- Visual feedback
- Discontinue conditions according to (De Renzi & Faglioni, 1978) original paper
- New languages
- iOS and Android operating systems

THE ETT-2: LANGUAGES AVAILABLE

- Afrikaans
- Akan
- Albanian
- Armenian
- Berber
- Bosnian
- Catalan
- Catalan from Valencia
- Chinese Mandarin (Mainland)
- Chinese Mandarin (Taiwan)
- Croatian
- Czech
- Danish
- Dutch
- English (American)
- English (Australian)
- English (British)
- English (Canadian)
- English (South African)
- Finnish
- Flemish
- French
- Frisian
- Galician
- German
- Greek
- Hebrew
- Hungarian
- Maltese
- Norwegian
- Persian
- Portuguese
- Portuguese (Brazilian)
- Russian
- Spanish
- Swiss German
- Tagalog
- Tatar
- Turkish

THE ETT-2: PROJECT OUTLINE

- Collect normative and psychometric data of the eTT-2 performance
  - Normative data from a large group of NBD and cutoffs
  - Data from a large group of PWA with different types of aphasia
  - Psychometric properties:
    - Test-retest reliability and practice effects in NBD and PWA
    - Concurrent validity of the app compared to paper-and-pencil TT (concurrent validity-1) in NBD and PWA
    - Concurrent validity of the eTT-2 compared to the standard clinical tools (concurrent validity-2) in PWA

TEST-RETEST RELIABILITY & PRACTICE EFFECTS IN NBD: RESULTS

- Test-retest reliability: is my test reliable over time?
- Practice effects: are there any learning effects in my test?
- Participants:
  - 20 NBD
  - native Russian speakers
  - 13 female
  - Age: *M* = 42.4 yo (20-72; *SD* = 17.16)
- Method:
  - Two testing sessions by the same experimenter
  - Time between sessions: *M* = 14.05 d (12-16; *SD* = 1)
  - Test-retest reliability: correlation analysis
  - Practice effects: paired-sample mean comparison

TEST-RETEST RELIABILITY IN NBD: RESULTS

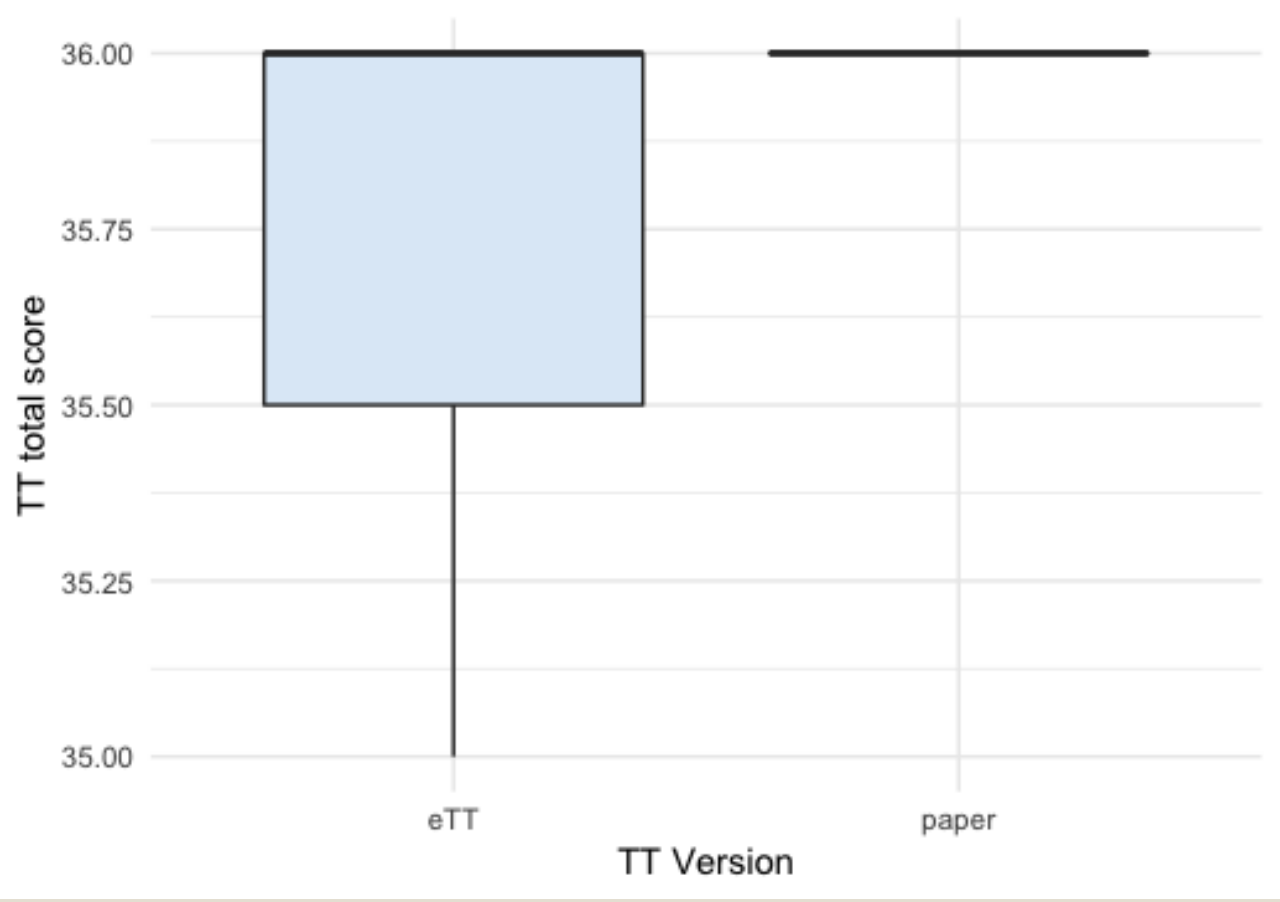
- Test-retest reliability:
  - Correlation non-significant
  - Probably, due to lack of variance in scores
- Practice effects:
  - Gains in scores are non-significant

	M	***min***	***max***	***SD***
session 1	34.86	33.0	36.0	0.92
session 2	35.33	33.5	36.0	0.85
session 2 - session 1	0.45	-1.5	3.0	1.11

CONCURRENT VALIDITY-1 IN NBD: PRELIMINARY RESULTS

- Participants:
  - 13 NBD
  - native Russian speakers
  - 9 female
  - Age: *M* = 37.85 yo (21-66; *SD* = 13.95)
- Method:
  - performed both paper-and-pencil and eTT-2 versions
  - the order was balanced

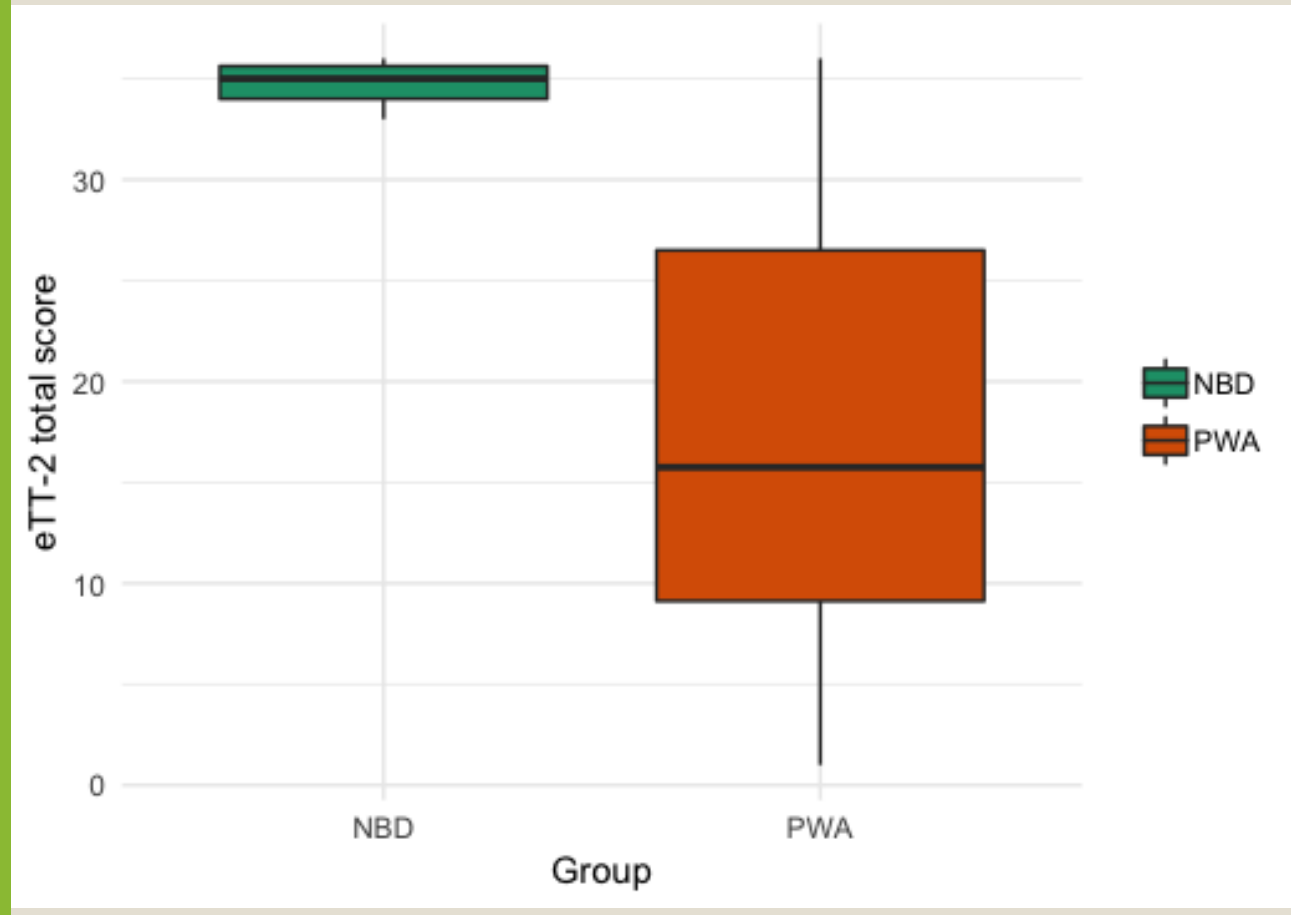
CONCURRENT VALIDITY-1 IN NBD: PRELIMINARY RESULTS



TT PERFORMANCE IN NBD VS PWA: PRELIMINARY RESULTS

- NBD:
  - Test-retest group: first session
  - 20 participants
  - native Russian speakers
  - 13 female
  - Age: *M* = 42.4 yo (20-72; *SD* = 17.16)
- PWA:
  - 21 participants
  - 7 female
  - Age: *M* = 62.24 yo (42 – 74; *SD* = 8.49)
  - Post onset: *M* = 26.86 m (1 – 88; *SD* = 29.48)
  - 7 fluent, 14 nonfluent
  - Severity ranging from mild to very severe
  - In-patient clients of the Center for Speech Pathology and Neurorehabilitation, Moscow

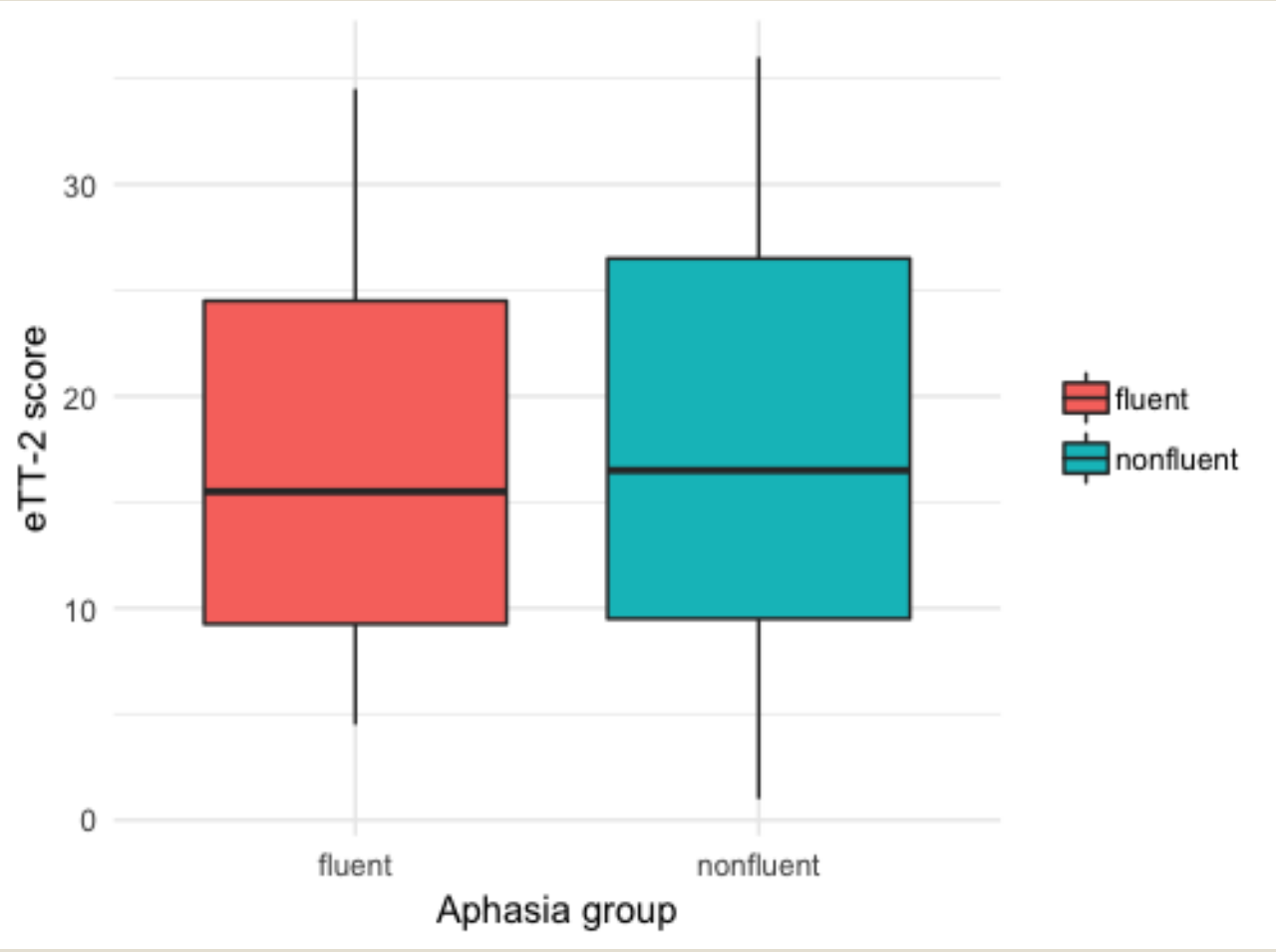
TT PERFORMANCE IN NBD VS PWA: PRELIMINARY RESULTS



TT PERFORMANCE IN FLUENT AND NON-FLUENT APHASIA: PRELIMINARY RESULTS

- Participants: same PWA group
  - 21 participants
  - 7 female
  - Age: *M* = 62.24 yo (42 – 74; *SD* = 8.49)
  - Post onset: *M* = 26.86 m (1 – 88; *SD* = 29.48)
  - 7 fluent, 14 nonfluent
  - Severity ranging from mild to very severe

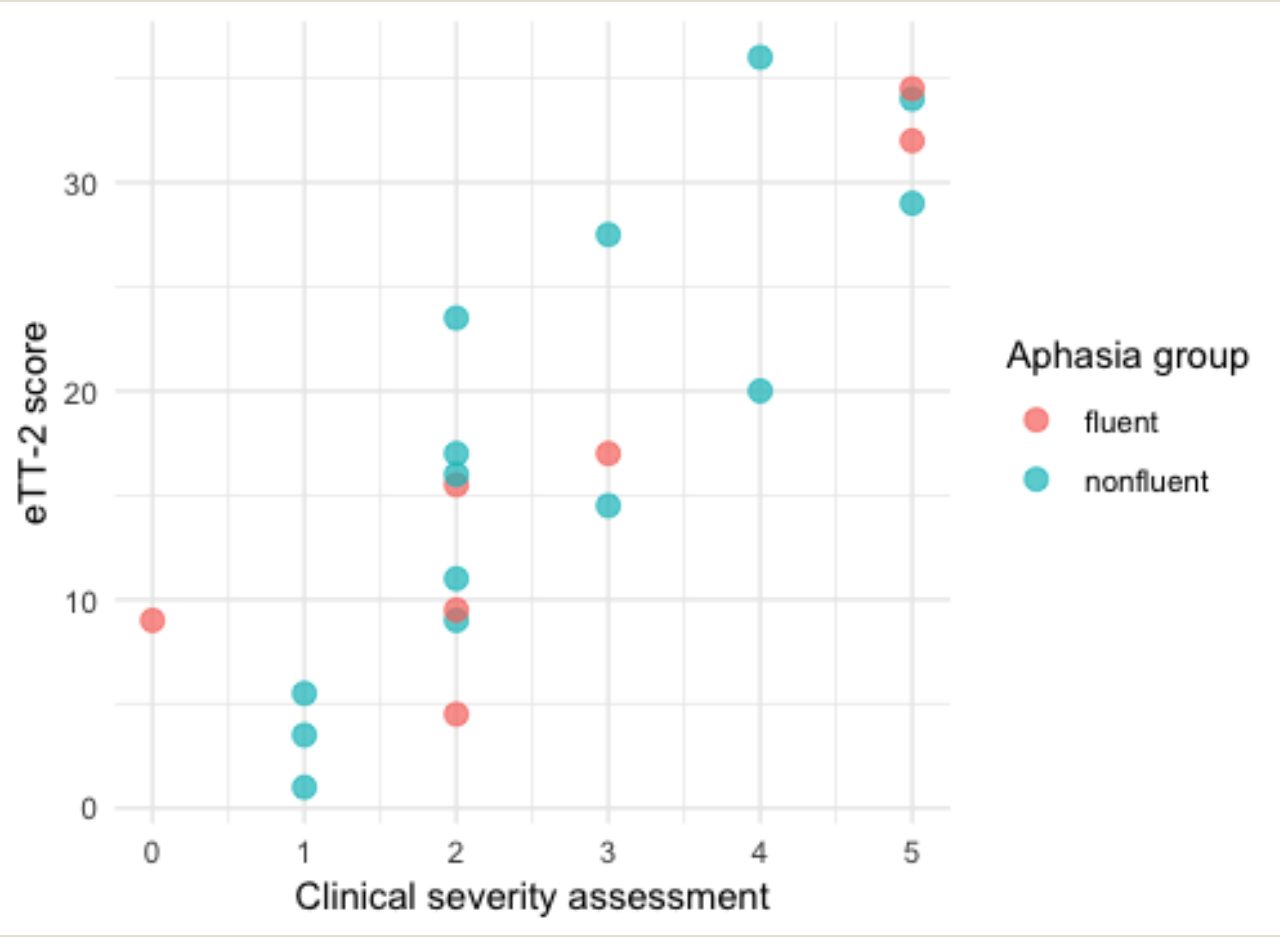
TT PERFORMANCE IN FLUENT AND NON-FLUENT APHASIA: PRELIMINARY RESULTS



CONCURRENT VALIDITY-2 IN PWA: PRELIMINARY RESULTS

- Participants: same PWA group
- Method: compare standard clinical severity assessment scale to the eTT-2 scores
- “Very mild” = 6, “very severe” = 0

CONCURRENT VALIDITY-2 IN PWA: PRELIMINARY RESULTS



SUMMARY

- Test-retest reliability in NBD:
  - No significant practice effects
  - Low test-retest reliability
  - Probably, clinically irrelevant
- Trends:
  - Good concurrent validity
  - Difference between NBD and PWA groups
  - No difference between fluent and non-fluent aphasia groups

SUMMARY

- More data will be collected and analyzed:
  - Normative data and cutoff scores
  - Performance in different aphasia subtypes
  - Concurrent validity-1 in PWA
  - Effects of standard demographic variables: age, level of education
  - Effects of tablet experience
  - Effects of manual apraxia
- The eTT-2 will soon be available in the Google Play and App Store

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