

# Rapid Online Assessment of Reading (ROAR): A platform for developmental cognitive neuroscience research at an unprecedented scale

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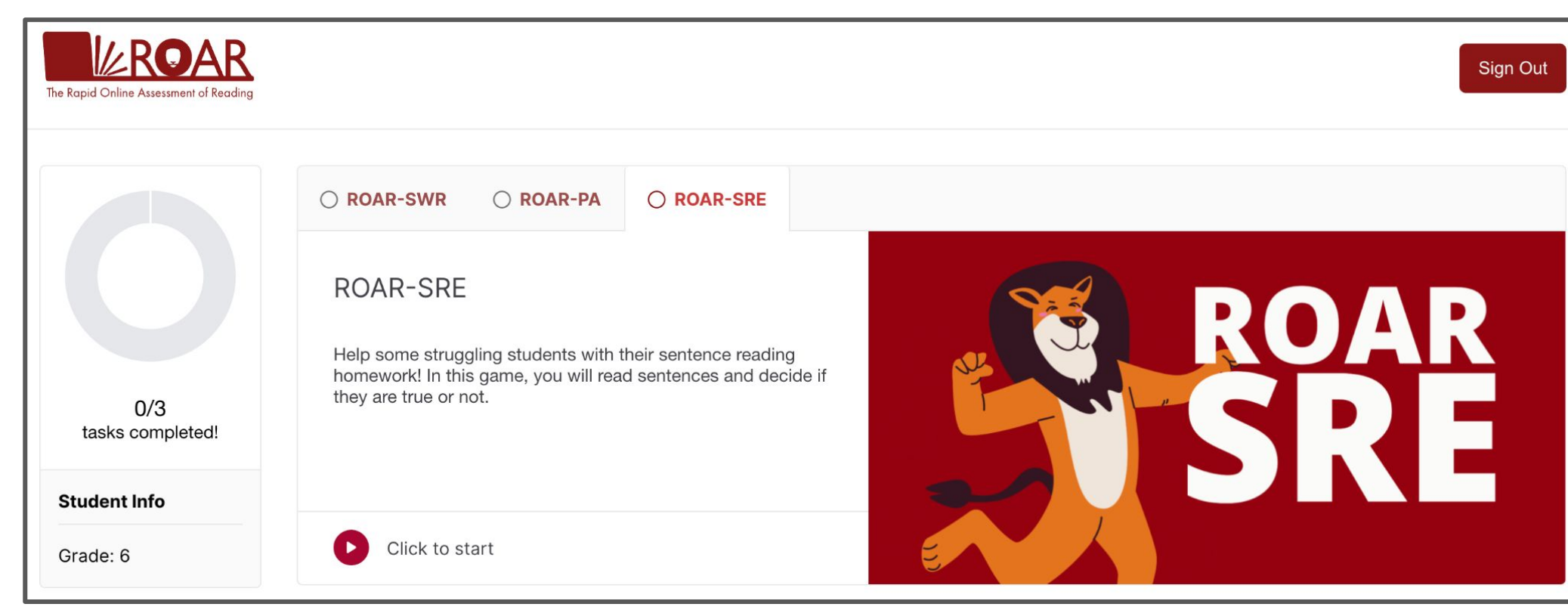
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## Background

- Developmental disorders manifest with heterogeneous phenotypes. Thus, it is critical to have a myriad of reliable measures that can characterize these phenotypes.
- Conventional measures are time consuming and resource intensive which decreases sample size and bias samples towards unrepresentative, well-resourced communities.
- We developed and validated the ROAR for **deep phenotyping**, the precise and comprehensive analysis of phenotypic variation, at an unprecedented scale.

## Methods

- Administered to over 7,000 participants, aged 4-40, through school partnerships, community organizations, clinics, and research labs across the US.
- Assessments are hosted on the ROAR dashboard that supports common single sign-on systems (SSO) such as Clever and Google for easy administration and tracking of large groups of participants.



Measure	Description
<b>Reading &amp; Language</b>	
Single Word Recognition (SWR)	Rapid recognition of real and pseudo words
Phonological Awareness (PA)	Awareness of the sound structure of spoken language: first sound matching, last sound matching and phoneme deletion
Sentence Reading Efficiency (SRE)	Efficiency and comprehension of reading sentences
Vocabulary	Receptive vocabulary (picture vocabulary)
<b>Visual Processing</b>	
Multi-Element Processing (MEP)	Visual attention span, or how many symbols or letters can be recognized in parallel
Motion Processing (MP)	Visual motion sensitivity
<b>Executive Function</b>	
Adaptive N-Back (ANB)	Working memory
Shape Matching	Cognitive control, or resistance to distractions

More assessments coming soon!  
Demo the current assessments at [roar.stanford.edu](http://roar.stanford.edu).

Free, open-source, and ongoing validation in the lab and classroom

Narrated instructions and practice trials with feedback

Gamification with engaging storylines and fun characters

Can be administered on computers, laptops, and tablets

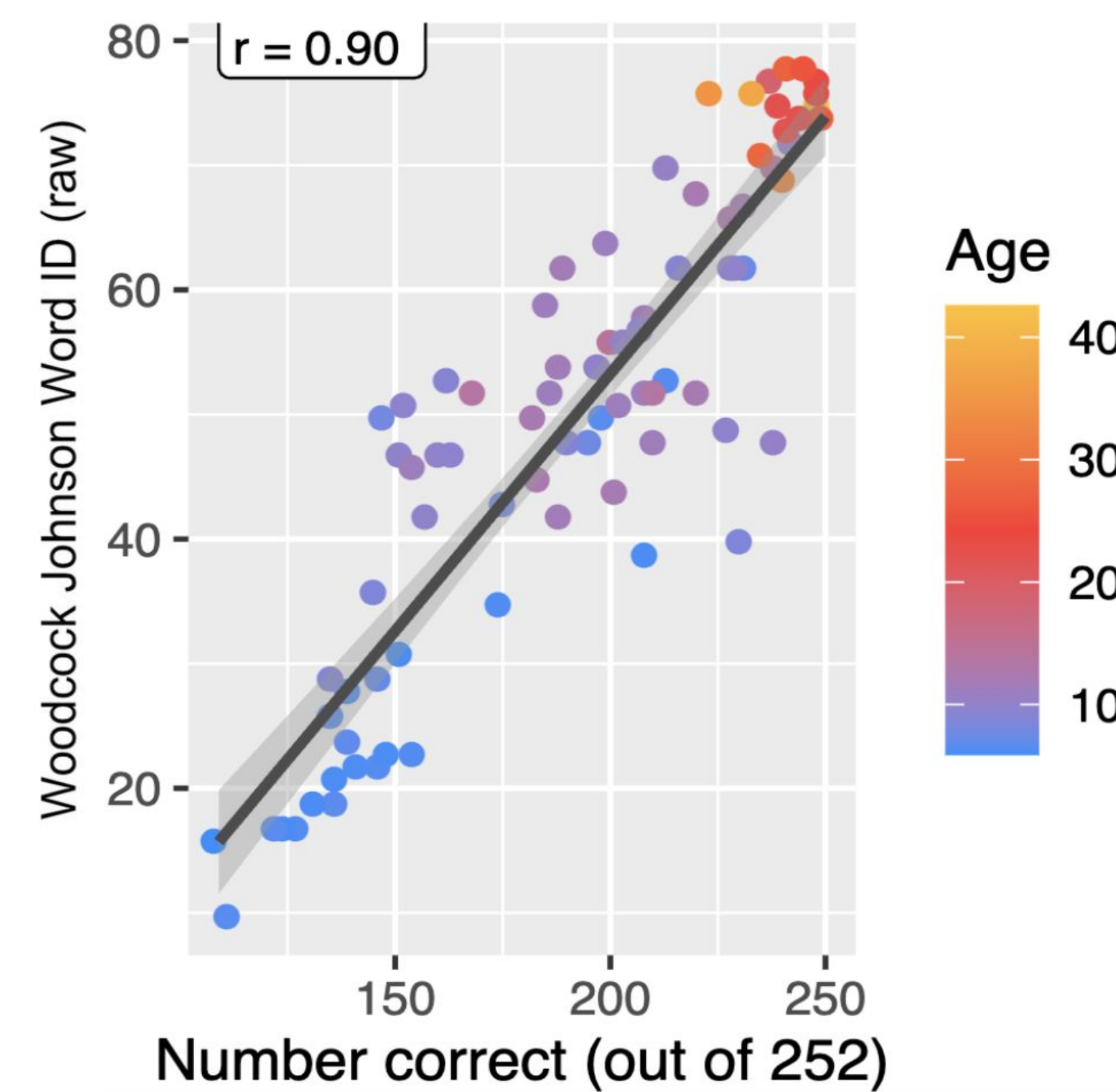


## Results

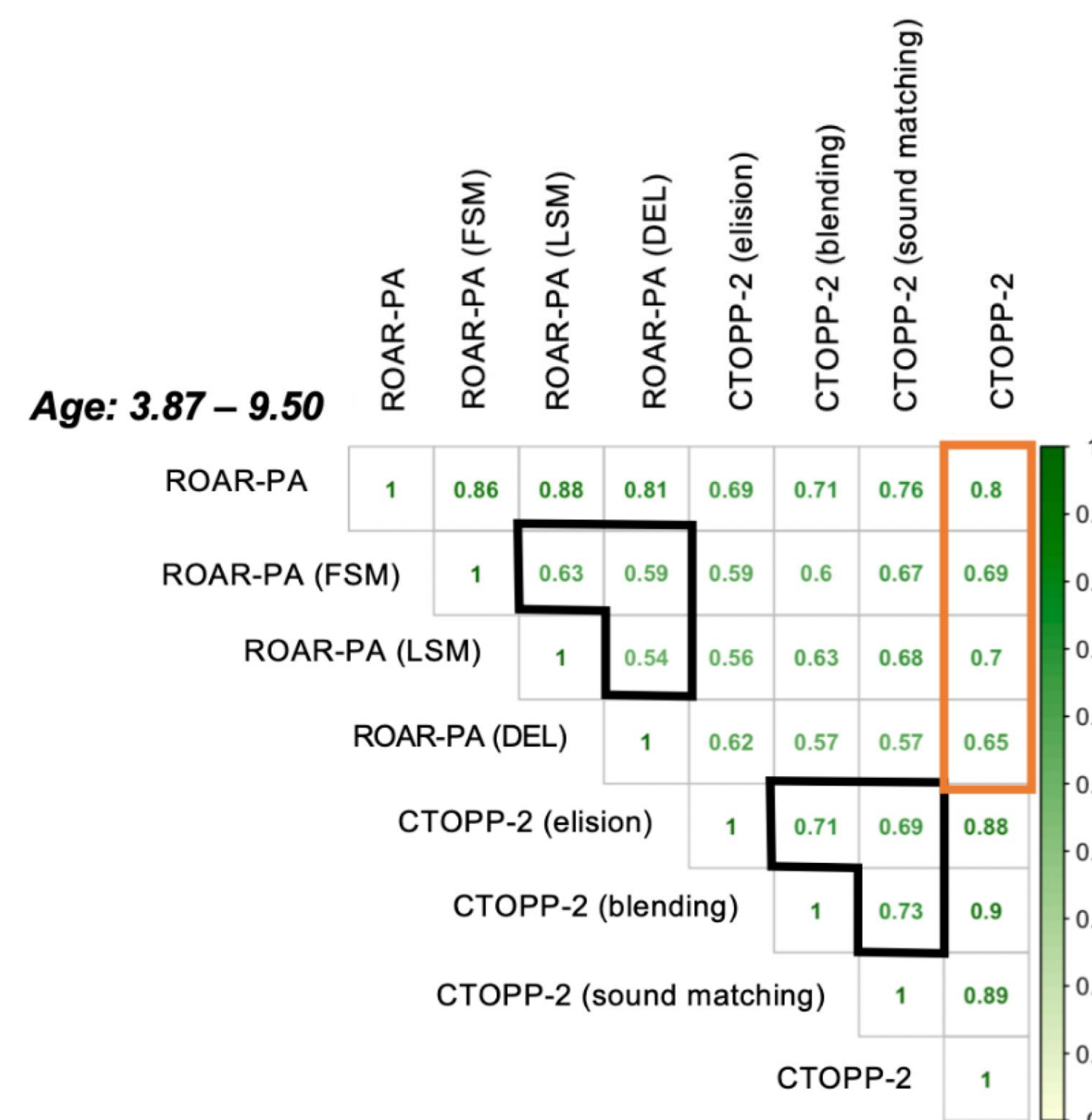
Online, automated measures of reading are highly correlated with standardized, individually-administered measures (N=116).

### ROAR-SWR

Scan here to read more about the validation

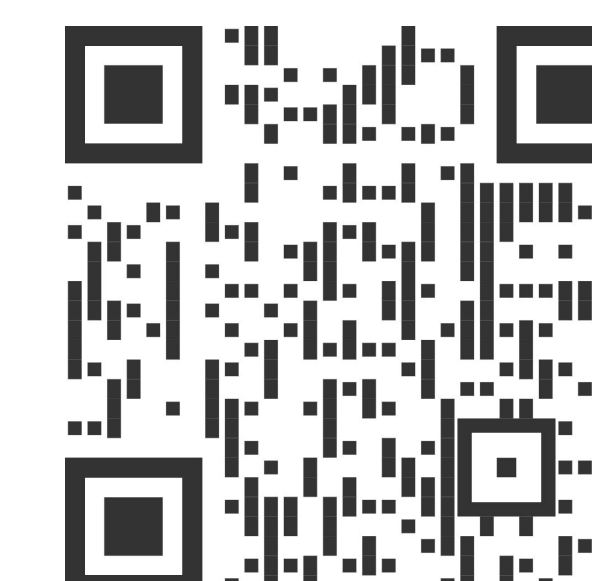


The composite scores of first sound matching (FSM), last sound matching (LSM), and deletion (DEL) are highly correlated with standardized phonological processing scores (N = 145).



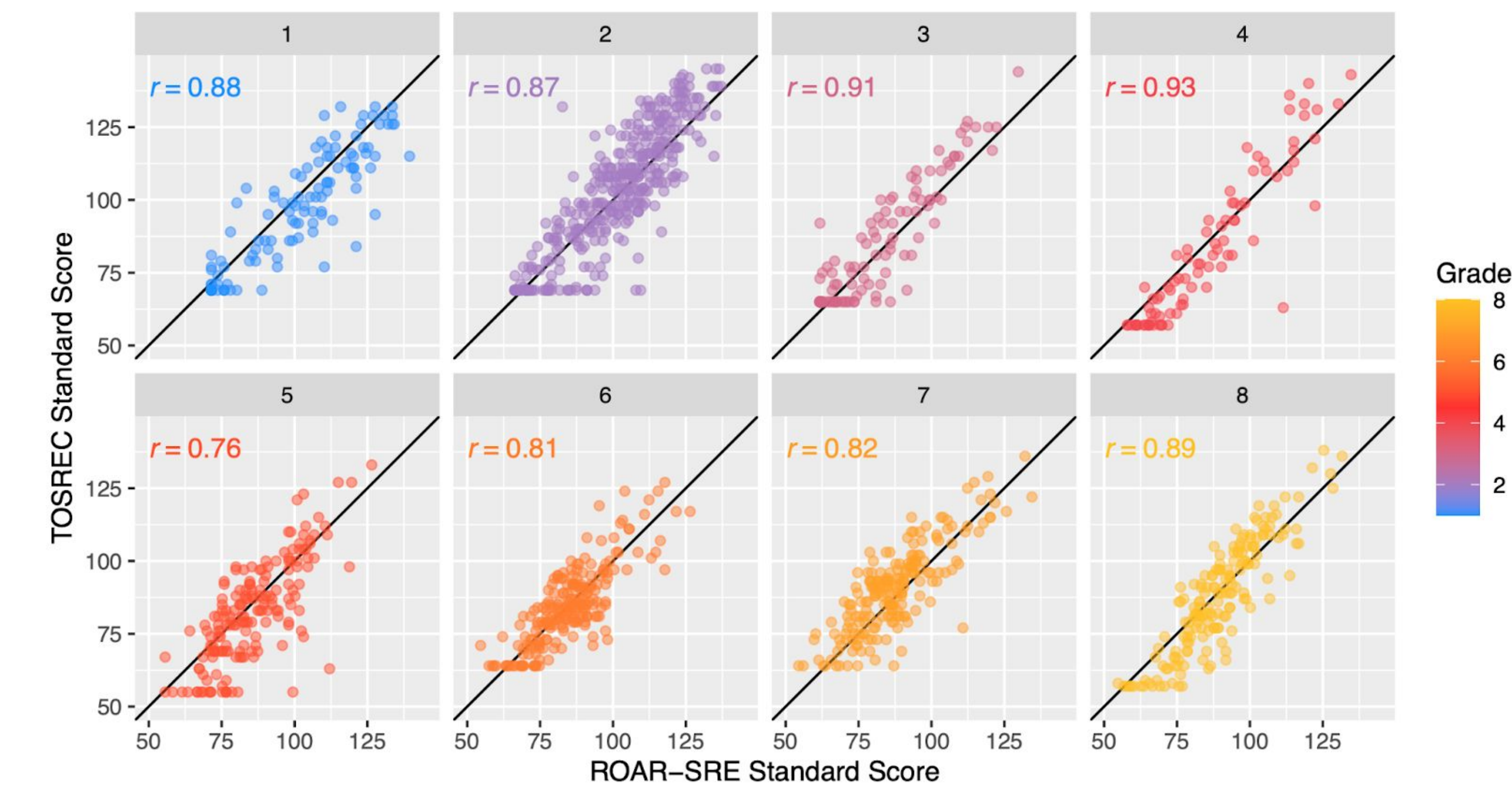
### ROAR-PA

Scan here to read more about the validation



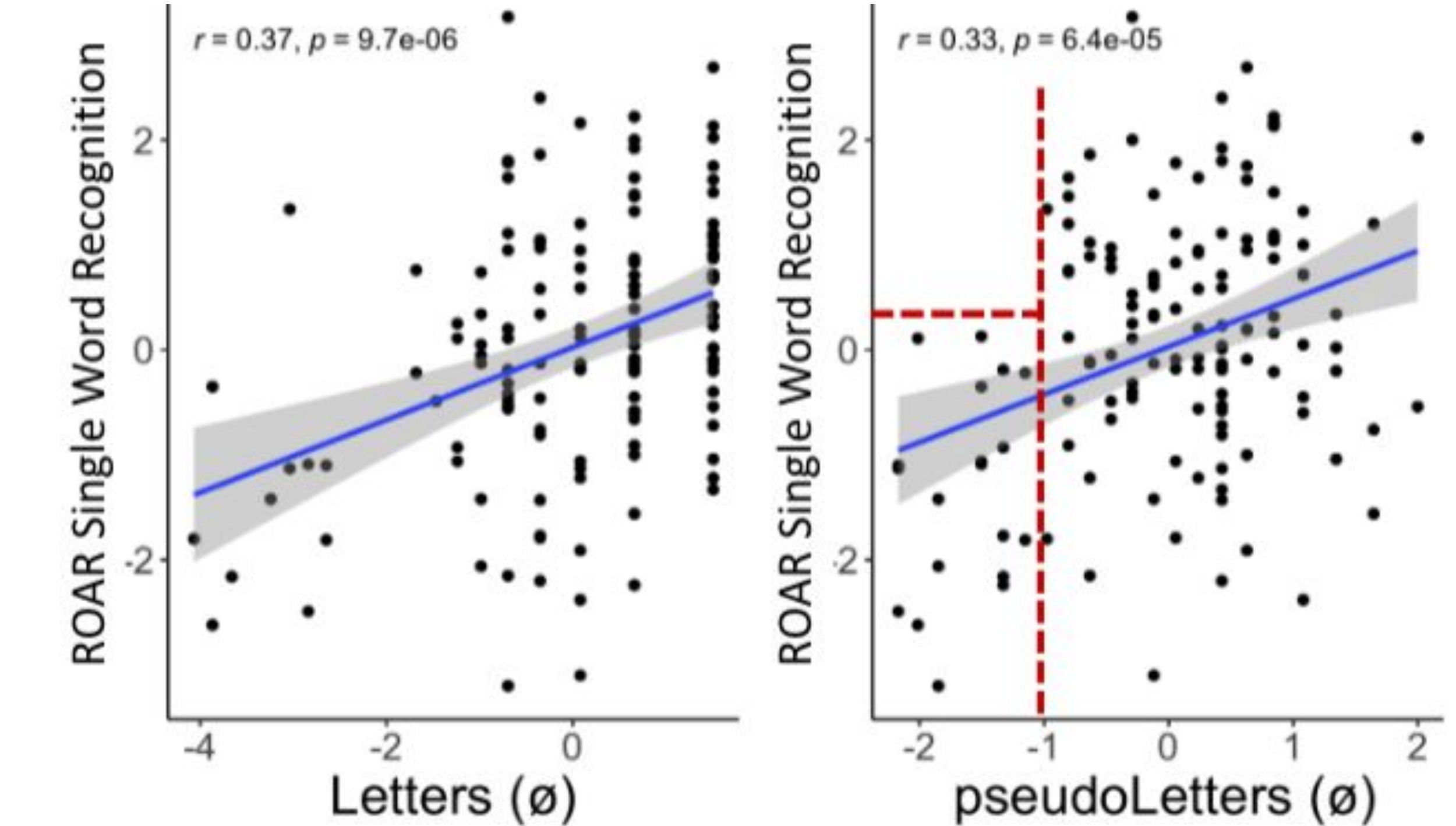
Sentence Reading Efficiency data can reliably predict performance on the Test of Silent Reading Efficiency and Comprehension across a broad grade range (N = 1998).

### ROAR-SRE



Visual processing measures are moderately correlated with reading ability measures.

### ROAR-MEP



## Discussion & Future Directions

- The ROAR platform overcomes the challenges of deep phenotyping by facilitating reliable and valid multidimensional data collection from large, representative samples.
- Based in community-based research, the ROAR is designed to be used in homes, schools, clinics, and laboratories.
- We aim to translate the platform and all assessments to other languages to best serve diverse populations.

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