

## Introduction

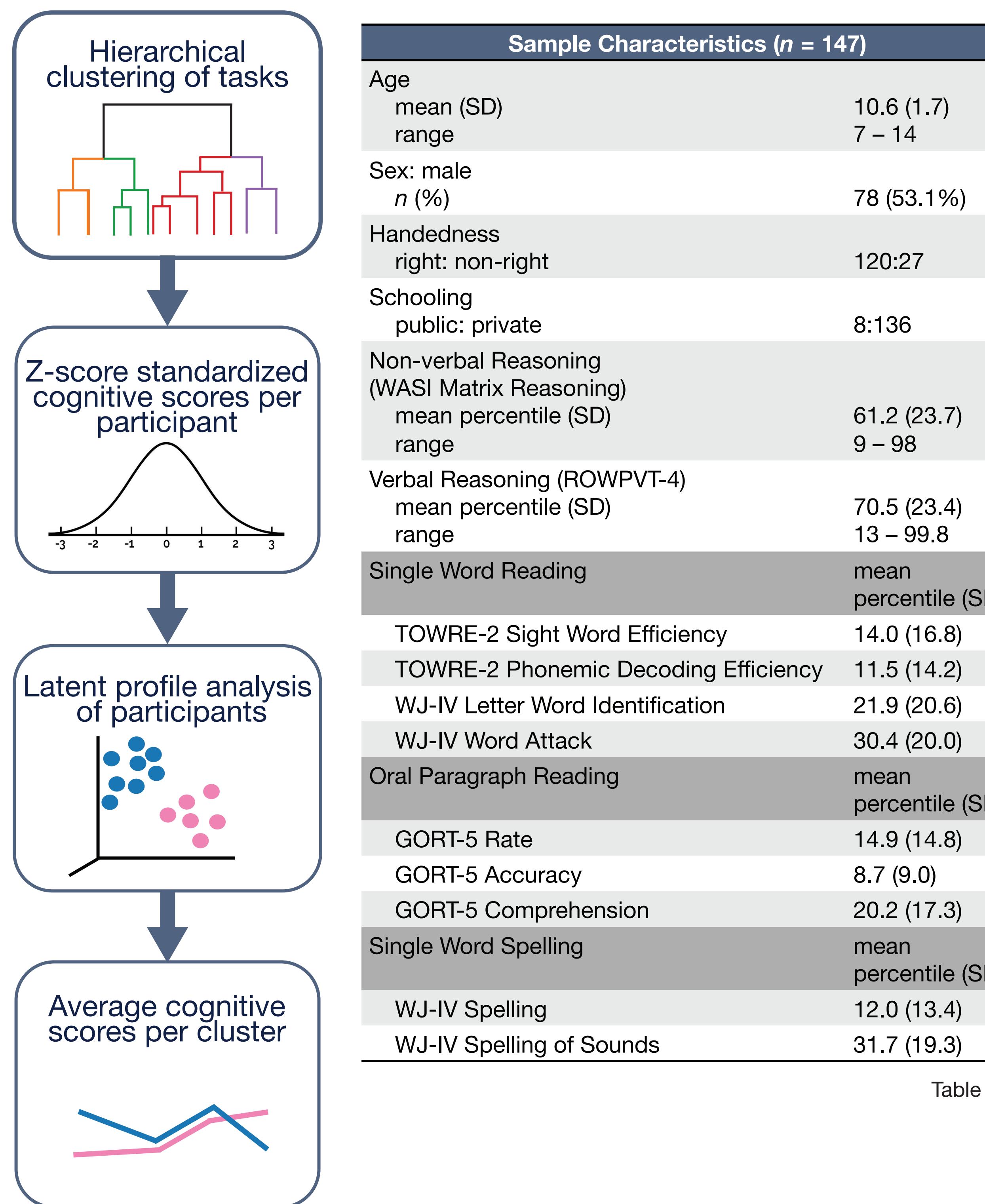
- Developmental dyslexia (dD)** is a neurodevelopmental disorder characterized by difficulties in reading despite adequate intelligence and education
- Aims:**
  - Identify distinct cognitive profiles of dD in a well-characterized cohort of children with persistent dyslexia despite intervention
  - Increase **precision** and **efficiency** in characterizing learning profiles by using data-driven methods
- Hypothesis:** Deviation from typical performance in specific cognitive subdomains may provide insight into subtypes of dyslexia

## Methods

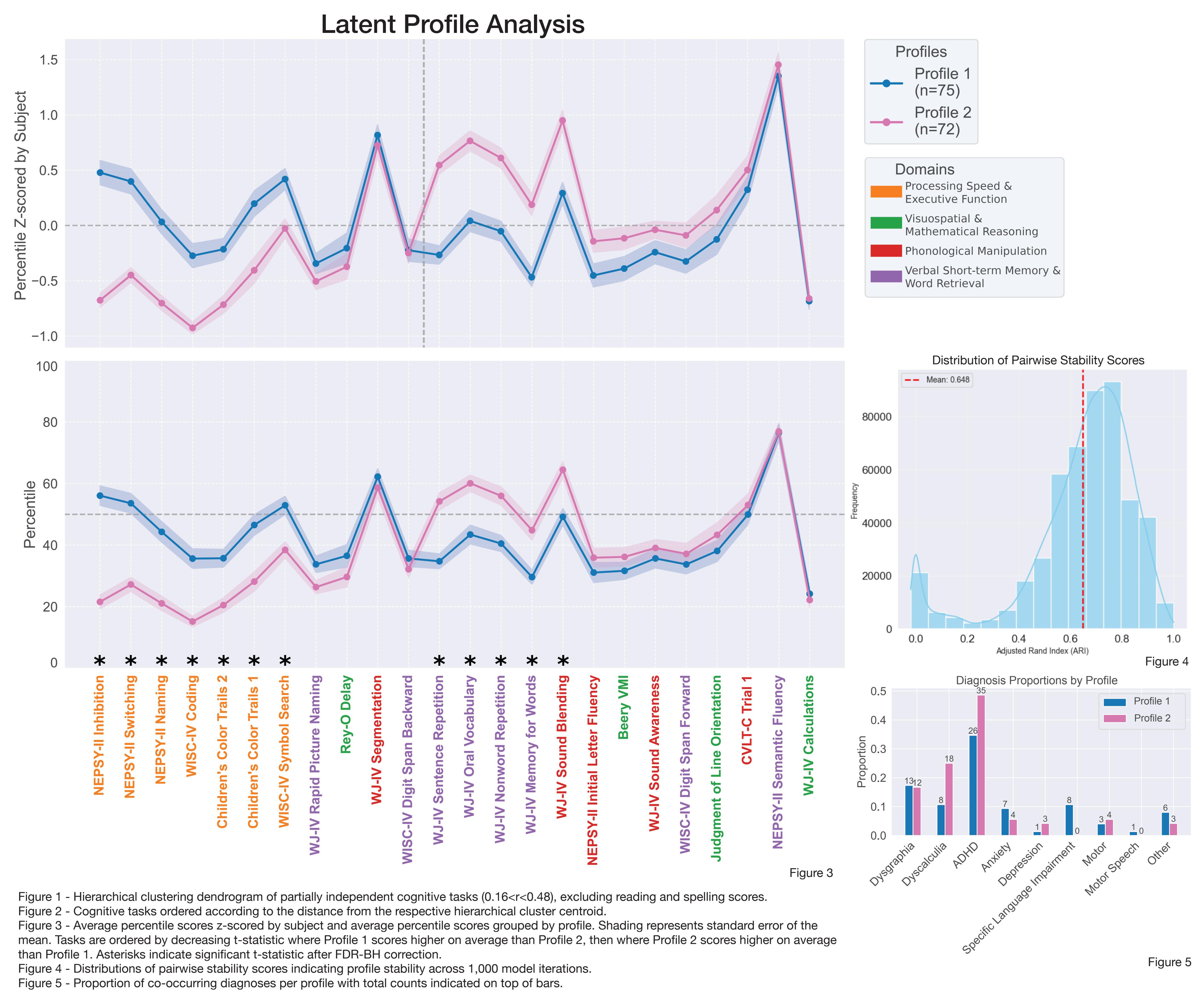
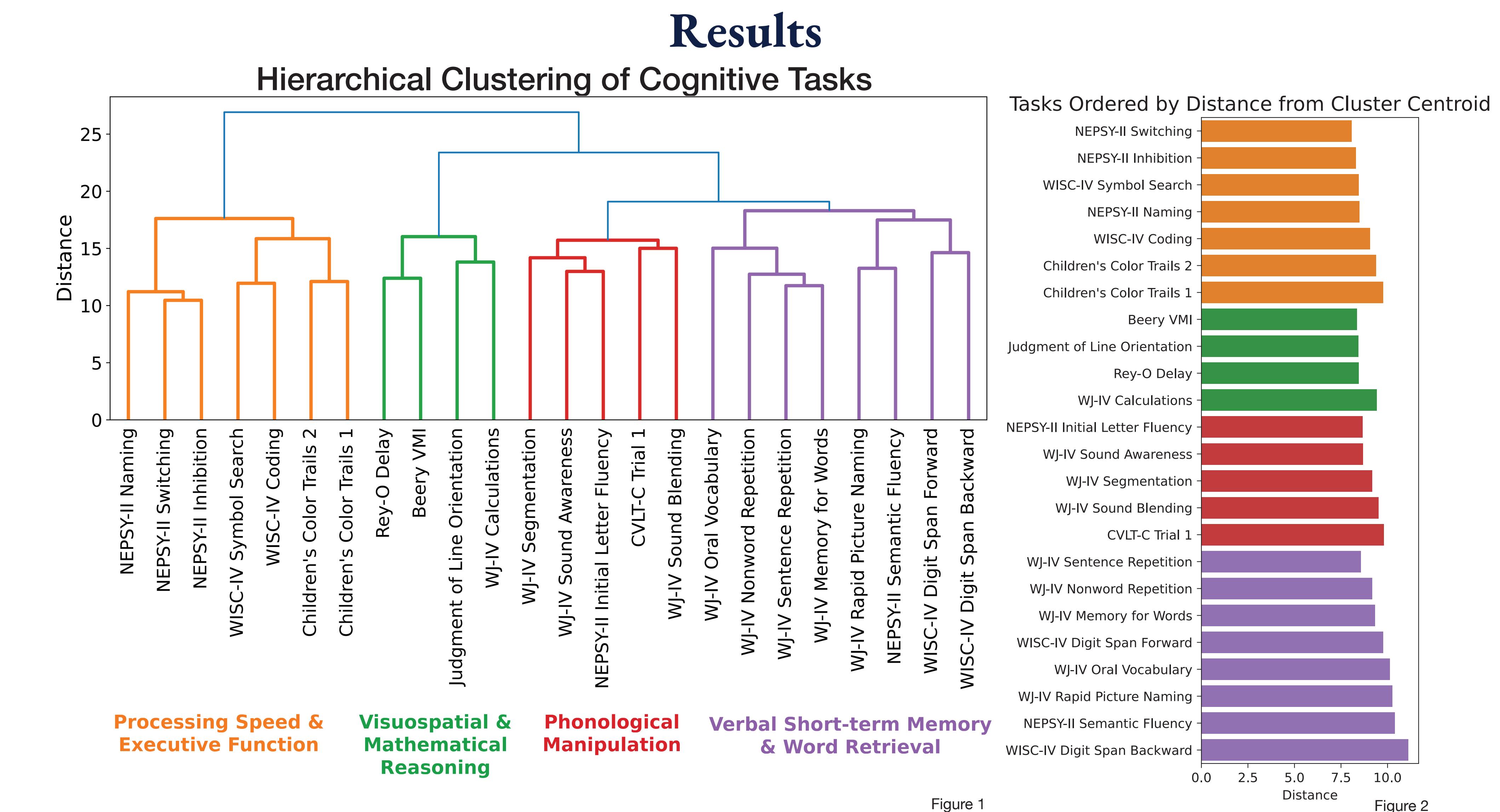
### Study Sample

- Participants ( $n=147$ ) received a comprehensive battery (15+ hours) of neuropsychological, academic, and language tests and MRI (3T Siemens Prisma) by an interdisciplinary team at the UCSF Dyslexia Center
- Children were referred with dD diagnosis and also diagnosed with dD by our team of trained neurologists and neuropsychologists
- Exclusion criteria:
  - did not have at least one reading scores (TOWRE-2 or GORT) < 20th percentile (i.e. indicating partially remediated reading ability)
  - clinically significant MRI findings warranting an immediate referral
  - non-verbal reasoning (WASI Matrix Reasoning) or verbal reasoning (ROWPVT-4) < 9th percentile
  - diagnosis of autism spectrum disorder

### Behavioral Data



## Data-driven Cognitive Clusters in Persistent Dyslexia



## Discussion

### Interpreting Dyslexia Phenotypes

- Profile 1:** relative weakness in verbal short-term memory and word retrieval
- Profile 2:** relative weakness in processing speed and executive function (impaired performance)
- No difference in reading performance between profiles
- Both profiles show relative weakness in visuospatial and mathematical reasoning
- Profile 2 has statistically significantly higher verbal intelligence percentile scores (ROWPVT-4:  $p=0.016$ )
- ADHD:**
  - No statistically significant difference in the proportion of ADHD
  - Supports literature stating that up to 50% of children with dyslexia show impaired executive functioning<sup>1</sup>

### Summary

- Findings highlight the importance of comprehensive neuropsychological evaluation of children with dD.
- i.e. working memory, executive function, word retrieval, visuospatial, and mathematical assessment, beyond traditional reading, spelling and phonology measures
- Results suggest distinct heterogeneity in dD manifestations, emphasizing the need for personalized assessment and intervention tailored to specific deficits

### Future Research

- Focus on identifying dD subtypes based on cognitive profiles and their corresponding neurodevelopmental trajectories
- Examine neuroanatomical correlates of identified profiles i.e. biomarkers from sMRI, DTI, and rs-fMRI
- Continue building a larger, more population-representative database of children: diverse geographical regions, races & ethnicities, and socioeconomic backgrounds

## Acknowledgments

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## References

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