

Assessing Spatial Cognition in Dyslexia and Developmental Language Disorders

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1. Background

Why Dyslexia & DLD?

Both disorders are accompanied by cognitive deficits:

Dyslexia: a neurodevelopmental disorder with a biological origin that is the basis for impairments at a cognitive level (DSM-V, p. 68)

DLD: the normal range of non-verbal IQ has been excluded from the DSM-5 for the diagnosis of DLD. With the exclusion of this criterion, the prevalence of the DLD, has risen from 7% (Tomblin et al., 1997) to almost 9% (Norbury et al., 2016)

Why Spatial Cognition?

The cognition of Space is a fundamental brain function including pre-lingual and basic-for-survival skills such as:

- Spatial awareness
- Orientation
- Navigation

2. Aim

Investigate if Spatial cognitive deficits accompany Dyslexia and DLD.

3. Innovation

Measuring the conception of Space by the use of Image Schemata: IN, ON, NEXT TO, UNDER

4. Research Questions

Part 1: Adults & TD children

1. Do image schemata (IN, ON, NEXT TO, UNDER) affect the performance of children and adults?
2. Does the type of the task (verbal/ non-verbal) affect the performance of the children and adults?

Part 2: D, DLD & TD children

3. Is the conception of image schemata different between clinical cases and typically developing children?
4. Do image schemata affect the performance of clinical cases and typically developing children?
5. Does the type of spatial task (verbal/ non-verbal) affect the performance of clinical cases and typically developing children?
6. Are the pragmatic skills (verbal task score) different between clinical cases and typically developing children?

5. Participants

Part 1: Adults & TD children (completed)

- TD7: typically developing children 7-7:11 years old (n =56)
- TD8: typically developing children 8-8:11 years old (n =56)
- Adults (n=2424)

Part 2: D, DLD & TD children (Undergoing research)

Experimental groups

- D7-8: children with dyslexia 7-8:11 years old (n =30)
- DLD7-8: children with DLD 7-8:11 years old (n =30)

Control groups

- CG6-8: control group of typically developing children, matched for non-verbal age, 6-8:11 years old (n =30)
- CG/LA/5-6: control group of typically developing children matched for verbal age 5-6:11 (n =30)
- TD7-8: typically developing children, 7-8:11 years old (n =112)

9. References:

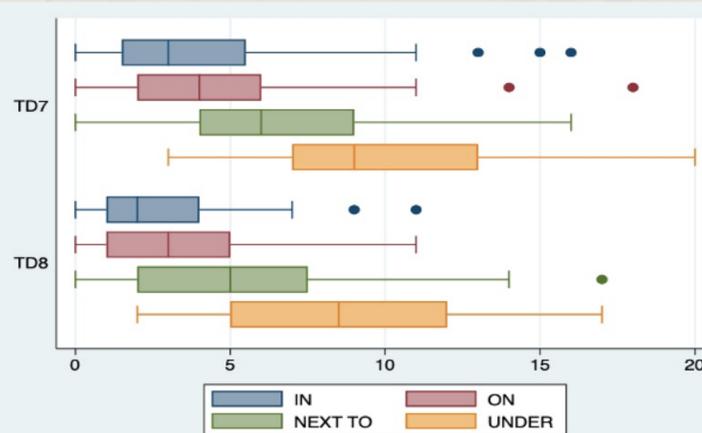
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- Norbury, C. F., Gooch, D., Wray, C., Baird, G., Charman, T., Simonoff, E., ... Pickles, A. (2016). The impact of nonverbal ability on prevalence and clinical presentation of language disorder: evidence from a population study. *Journal of Child Psychology and Psychiatry and Allied Disciplines*, 57(11), 1247-1257. <https://doi.org/10.1111/jcpp.12573>
- Tomblin, J. B., Records, N. L., Buckwalter, P., Zhang, X., Smith, E., & O'Brien, M. (1997). Prevalence of Specific Language Impairment in Kindergarten Children. *Journal of Speech, Language, and Hearing Research*, 40(6), 1245-1260. <https://doi.org/10.1044/jslhr.4006.1245>

6. Methodology

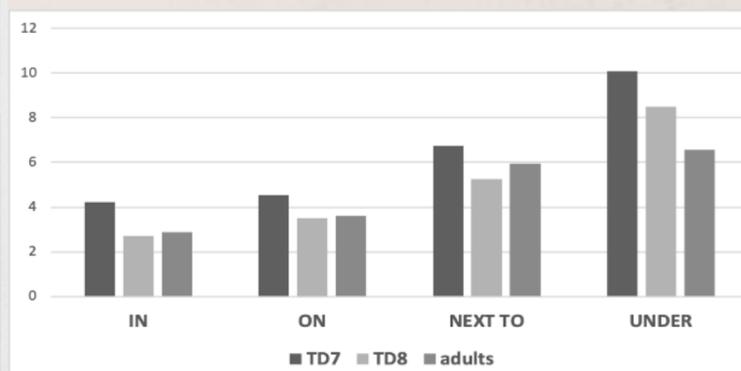
The Spatial Tasks are distributed:

- on-line to adults
- in hard copies to children

7. Results so far from Adults & TD Children

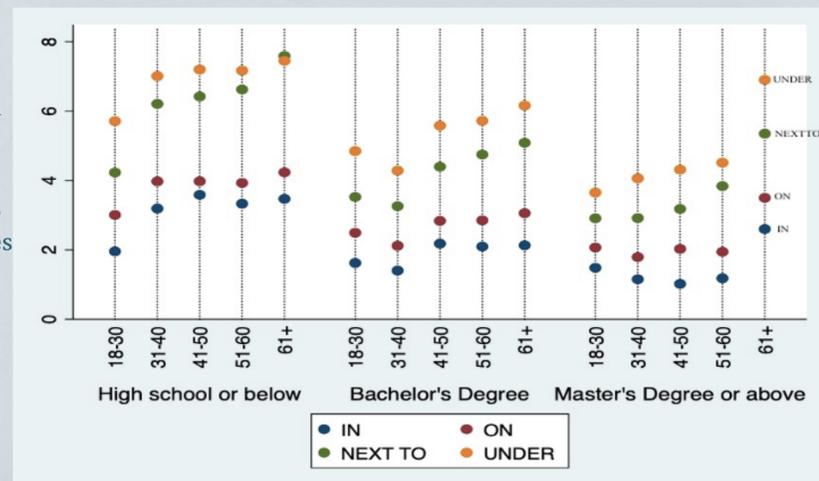


Distribution of errors in Image Schemata IN<ON<NEXT TO<UNDER in typically developing children 7 and 8 yrs



The mean errors of Image Schemata are IN<ON<NEXT TO<UNDER in typically developing children and healthy adults

The mean errors in Image Schemata are IN<ON<NEXT TO<UNDER across different age ranges and educational levels in adults



8. Future expectations

Image schemata IN, ON, NEXT TO, UNDER, which compile the Spatial Tasks, seem to be sensitive clinical markers in detecting the different performances between different ages and educational levels in TD children and adults.

Therefore we expect to be able to detect the differences in the performance between TD children and children with Dyslexia and DLD

[On-line Spatial Tasks](#)
click here