PROFILING TIME PROCESSING SKILLS IN DYSCALCULIC PRIMARY AND MIDDLE SCHOOL CHILDREN

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Theoretical Background

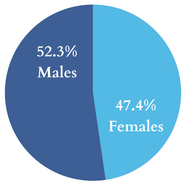
- **Time processing skills**: range from basic (e.g., estimating, reproducing, discriminating durations) to complex abilities like time orientation and time management (Grondin, 2010).
- Impact: **deficits affect daily life** in both structured (school, work) and unstructured (social, family) settings.
- The **Theory of Magnitude (ATOM)** links time, number, and space through a shared magnitude system (Walsh, 2003).

Aim of the Study

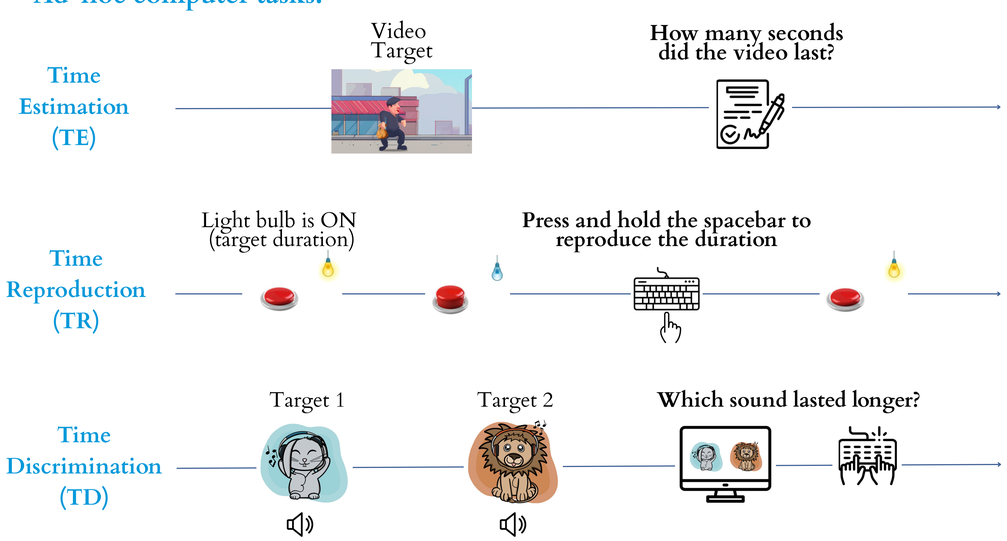
Investigate time processing profiles in children with Developmental Dyscalculia (DD).

Methods and Analysis

333 children from 3rd to 7th grade (ages 8–11)
mean age = **9,84** ± 1.38 y



Ad-hoc computer tasks:



- **Sense of Time Questionnaire** (QST; Tobia et al., 2018) administered to children, parents and teachers.
- **Mathematical abilities**: Numerical Reasoning, Counting, Number Line, Number Comparison and Mental Calculation (BDE-2, 2016).

Analysis

Spearman's correlations were used to examine associations between time processing variables and numerical abilities. The Mann-Whitney U test was conducted to compare the 13 children with developmental dyscalculia (DD) to a typically developing (TD) subsample, balanced for gender and grade. The distribution of time-related deficits in individuals with DD was compared to the theoretical distribution.

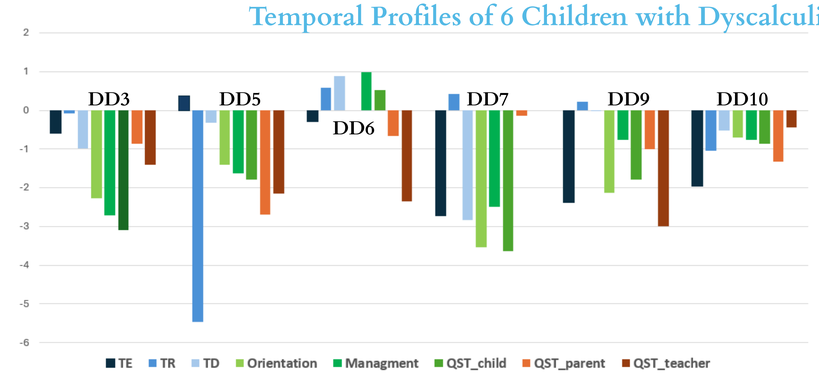
Results

13 DD	Males	Females
3rd grade	1	1
4th grade	1	1
5th grade	0	6
6th grade	1	0
7th grade	1	1

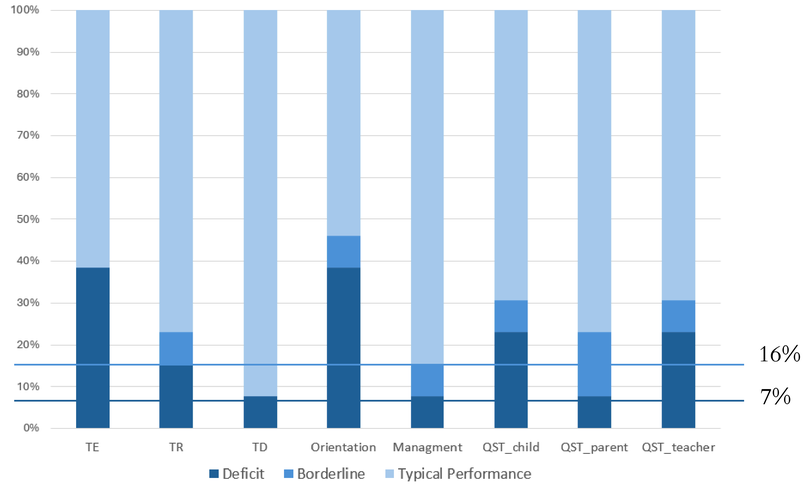
- Spearman's non-parametric correlations showed moderate associations between time processing variables and numerical ability measures (ranging from 0,187 to 0,467, all $p < .01$).
- The Mann-Whitney U test revealed significant differences between TD and DD only for the Child QST ($p = 0{,}003$).

The lines in the figure represent the theoretical normal distribution for scores below −1.5 SD (indicative of a deficit) and between −1.5 and −1 SD (borderline range).

Temporal Profiles of 6 Children with Dyscalculia



Percentage of Children with Developmental Dyscalculia who Showed a Deficit (<-1.5 SDs), a Borderline Level (-1 to 1.5 SDs) or a Typical Performance on Each Temporal Task



Discussion and conclusions

- The **ATOM theory** is **supported** by the observed link between numerical and temporal abilities; in future research, it would be valuable to also assess **spatial skills**. Future studies should consider cognitive abilities that may mediate these associations.
- The **sample** of children **with DD should be increased** to determine whether significant differences emerge in other time-related variables.
- The percentages of children with DD showing a deficit, when compared to the theoretical normal distribution (Bonifacci & Tobia, 2016), suggest the higher presence of impairments in time estimation and everyday time management (e.g., time orientation).

References

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