

A NOVEL TEST BATTERY FOR LUXEMBOURG TO DIAGNOSE SPECIFIC LEARNING DISORDER IN MATHEMATICS IN THIRD-GRADE CHILDREN

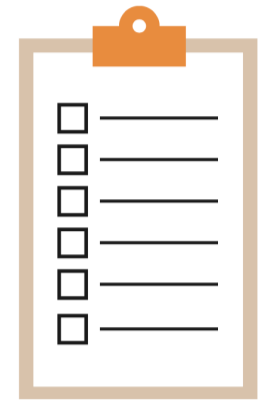
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Background



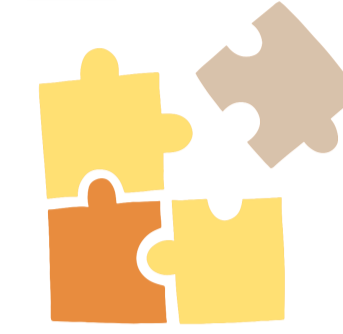
Diagnostic test batteries for math learning disorder = generally relying on language
 → test language proficiency may affect math performance [1]
 → important in **multilingual contexts**



Luxembourg: most children's home languages ≠ math instruction language (i.e., German) [2]
 → impact on school performance [3,4]



Challenge to **disentangle language difficulties from learning disorders**, especially as currently used tests rarely consider linguistic heterogeneity [1]



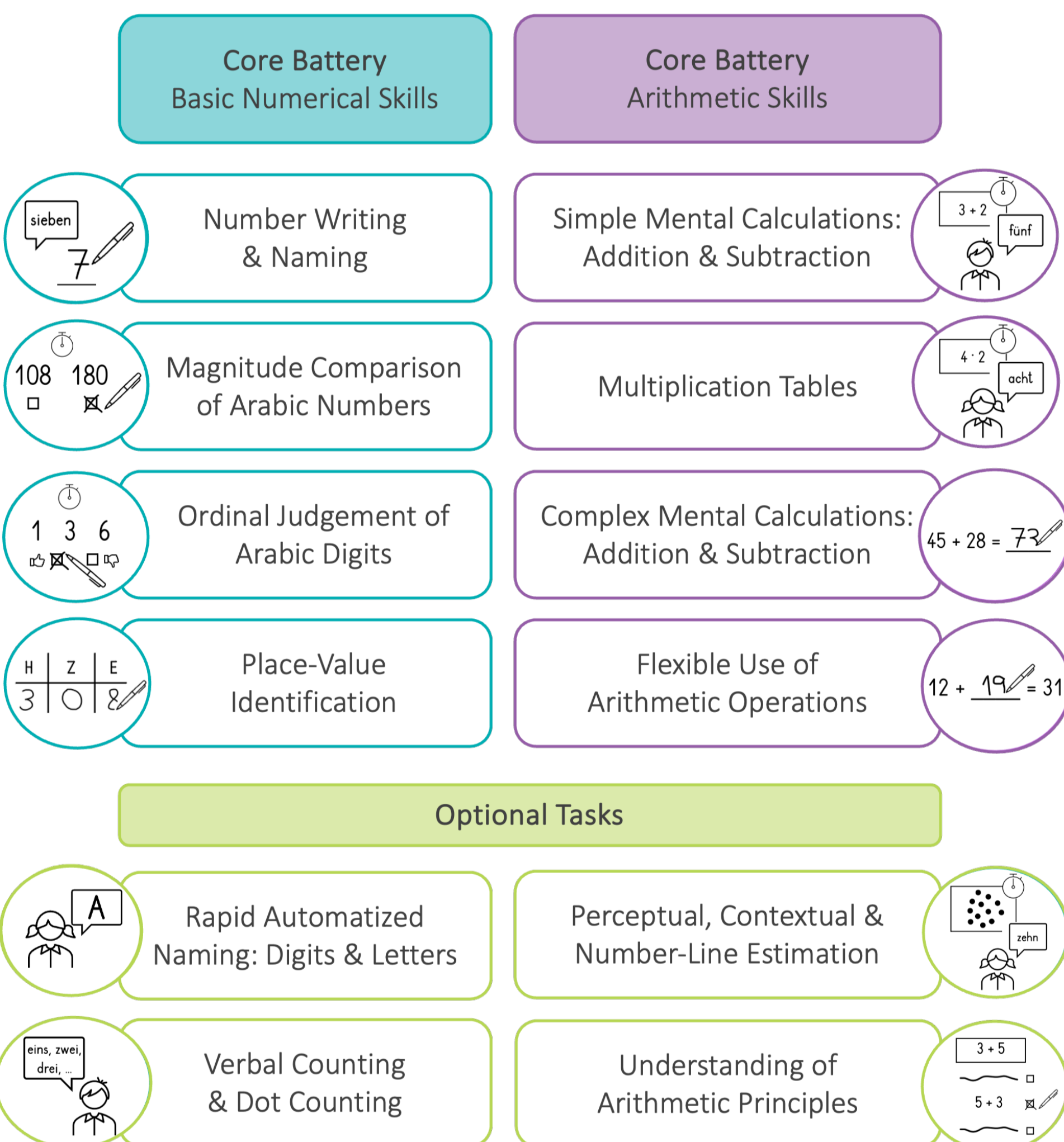
Aim of the project:

Development of a **test battery in mathematics** tailored to a multilingual education context to optimize the diagnostic process

Characteristics of the test battery:

- Target population = **third-grade** children (age ≈ 8-10)
- Experimental approach (i.e., systematic manipulation of targets)
- Content in line with national school curriculum
- Reduced language load [5]
- Test instructions: possibility for standardized switch of languages
- Example and practice items
- Reference norms based on home languages [1]

The Test Battery

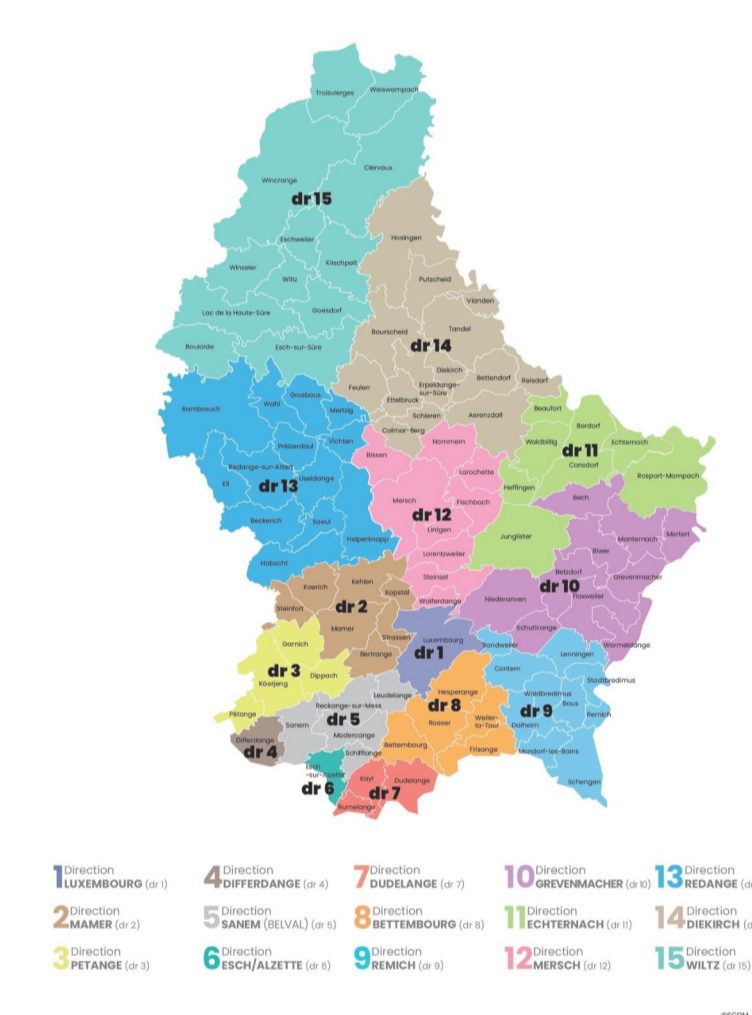


Look at all the amazing features!

- Individual profile of weaknesses and strengths
- Standardized administration and scoring
- Assessment of mathematical language
- Additional qualitative observations
- Reduced visual distraction
- Use of familiar fonts from schoolbooks

Norm Sample (data collected in February & March 2023)

Directions de l'enseignement fondamental au Luxembourg



N = 697
(49.2% girls)

Language Group	N	Percentage
Lux./German	294	42.2%
French	123	17.6%
Portuguese	118	16.9%
Other Languages	162	23.2%

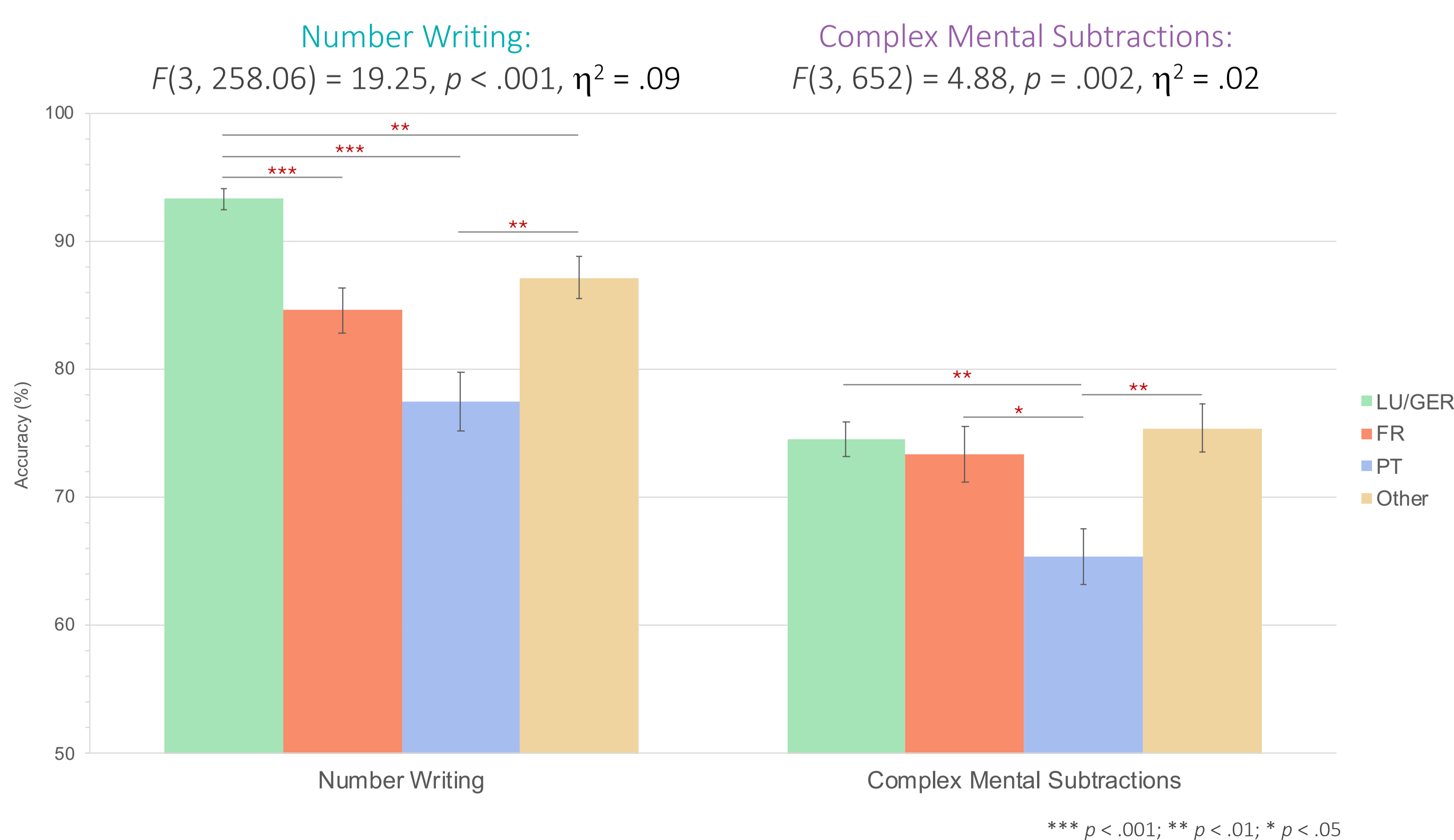
Psychometric Criteria

Objectivity	Standardized administration & scoring
	Reference norms per language group
Reliability (internal consistency)	Basic numerical skills: $\omega = .89$
	Arithmetic skills: $\omega = .89$
Validity (corr. with ÉpStan-math)	Basic numerical skills: $\rho = .44^{***}$
	Arithmetic skills: $\rho = .59^{***}$

*** $p < .001$

Example Results

Effects of Home Language on Subtest Performance



Discussion

Performance differences (small-to-medium effects), mainly in favor of children in the Luxembourgish/German home language group



- Language as barrier for equal achievement possibilities
- Importance of considering language background with **separate reference norms**
- Provide a **fairer diagnosis & adequate support** to children experiencing persistent math learning difficulties



Outlook:

- Finalization of materials
- Publication of the test battery