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CSP **Center scientific da cumpetenza per la plurilinguitad** Cogniziun Società Formation Bildung Migration Furmaziun Gesellschaft
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KFM **Wissenschaftliches Kompetenzzentrum für Mehrsprachigkeit** Société Cognizione Migraziun Schule Communauté Kognition
RCM **Research Centre on Multilingualism** Formazione Lavoro Politics Comunità Work Politik Lavur Politica Formation Gemeinschaft

Exploring Construct Equivalence of SAQ and MCQ Items Using IRT

How Uniformly Do Different Item Types Measure Reading Comprehension among 6th Graders Learning French?

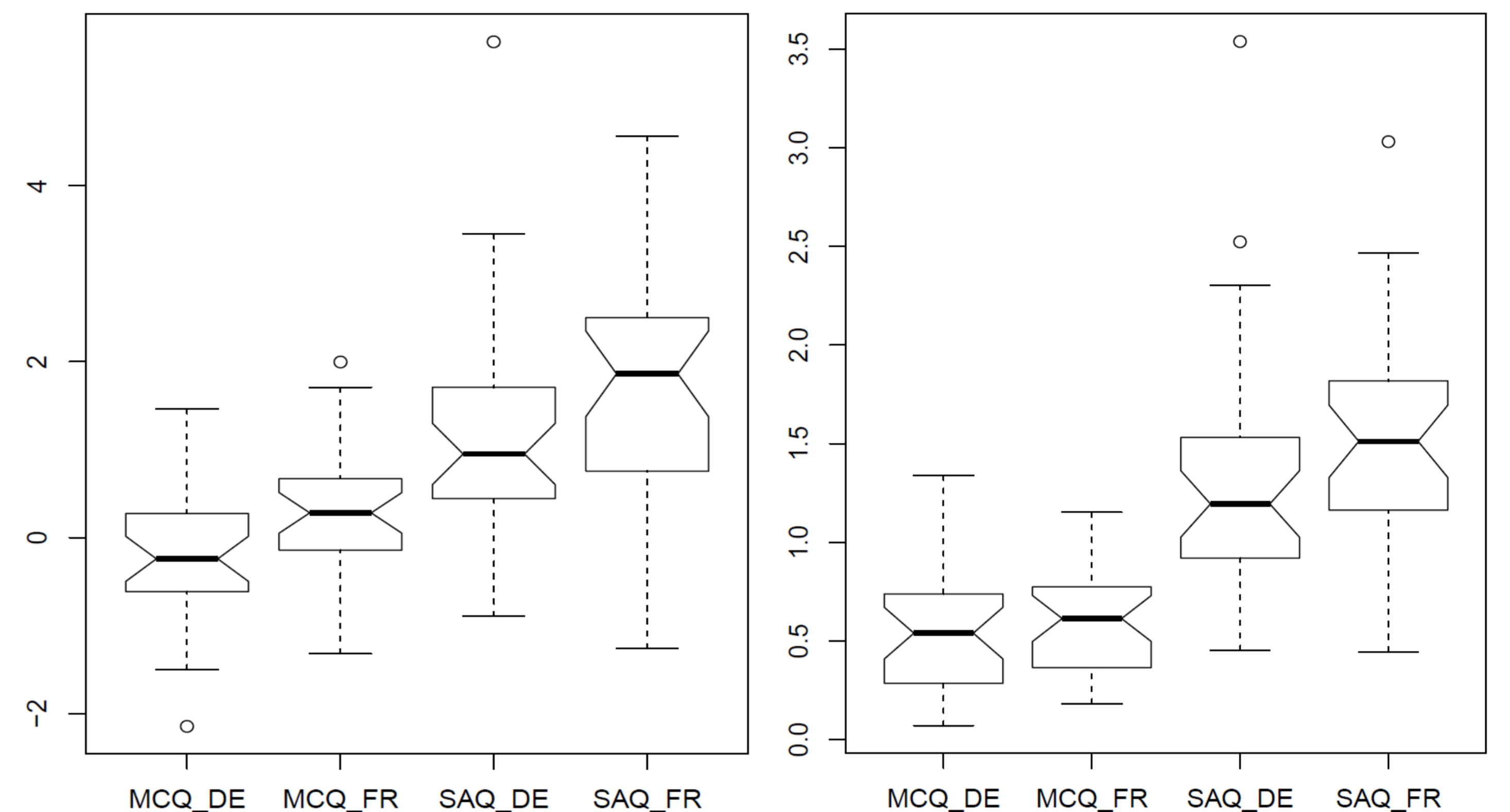### Peter Lenz , Malgorzata Barras, Katharina Karges / Task Lab Project

READING TASKS USED

'Same' task • 2 item types • 2 languages (for questions & answers)

N ≈ 600 6th graders in 35 classes solved a sample of tasks in all 4 variants.

As expected, a **2PL model**, accounting for individual item discriminations fits better:
```
Rasch Mod. vs. 2PL Mod.(dev. diff):
  χ²(328, 125), p < 0.001
```

2PL model with 2 slope groups (SAQ = 1.27; MCQ = 0.58):

- **better deviance, AIC and BIC than Rasch**
- **worse deviance, better AIC, BIC than unrestricted 2PL model**

Some Observations

- SAQ items are relatively **more difficult** (*no problem*).
- The SAQ items together form a longer measurement scale, i.e. they **differentiate** better between students.
- The individ. SAQ items have (much) **higher discrim.** => There are 2 item groups present (MCQ vs. SAQ)
- For the low ability group of test-takers, SAQ items are relatively more difficult than for the high ability group – the opposite is true for MCQ items.
  => **Violates** the principle of **specific objectivity**.

HOW DO SAQ AND MCQ ITEMS 'BEHAVE'? FINDINGS FROM 1-DIMENSIONAL ANALYSIS

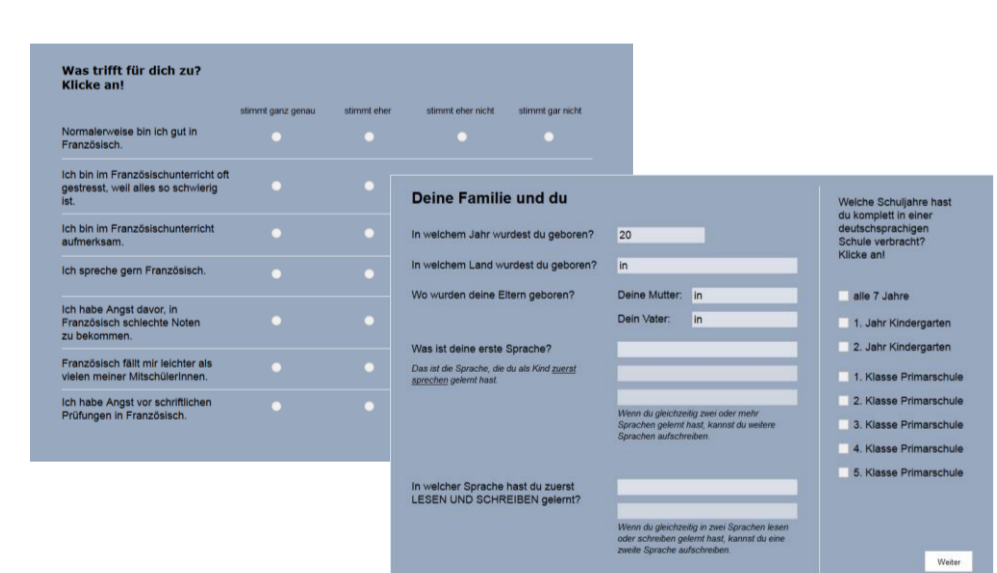**Item Difficulties on Item Type X Language**   **Item Discriminations on Item Type X Language**

Profile Analysis (Verhelst, 2011)
Deviations of relative item difficulties for three ability groups of learners
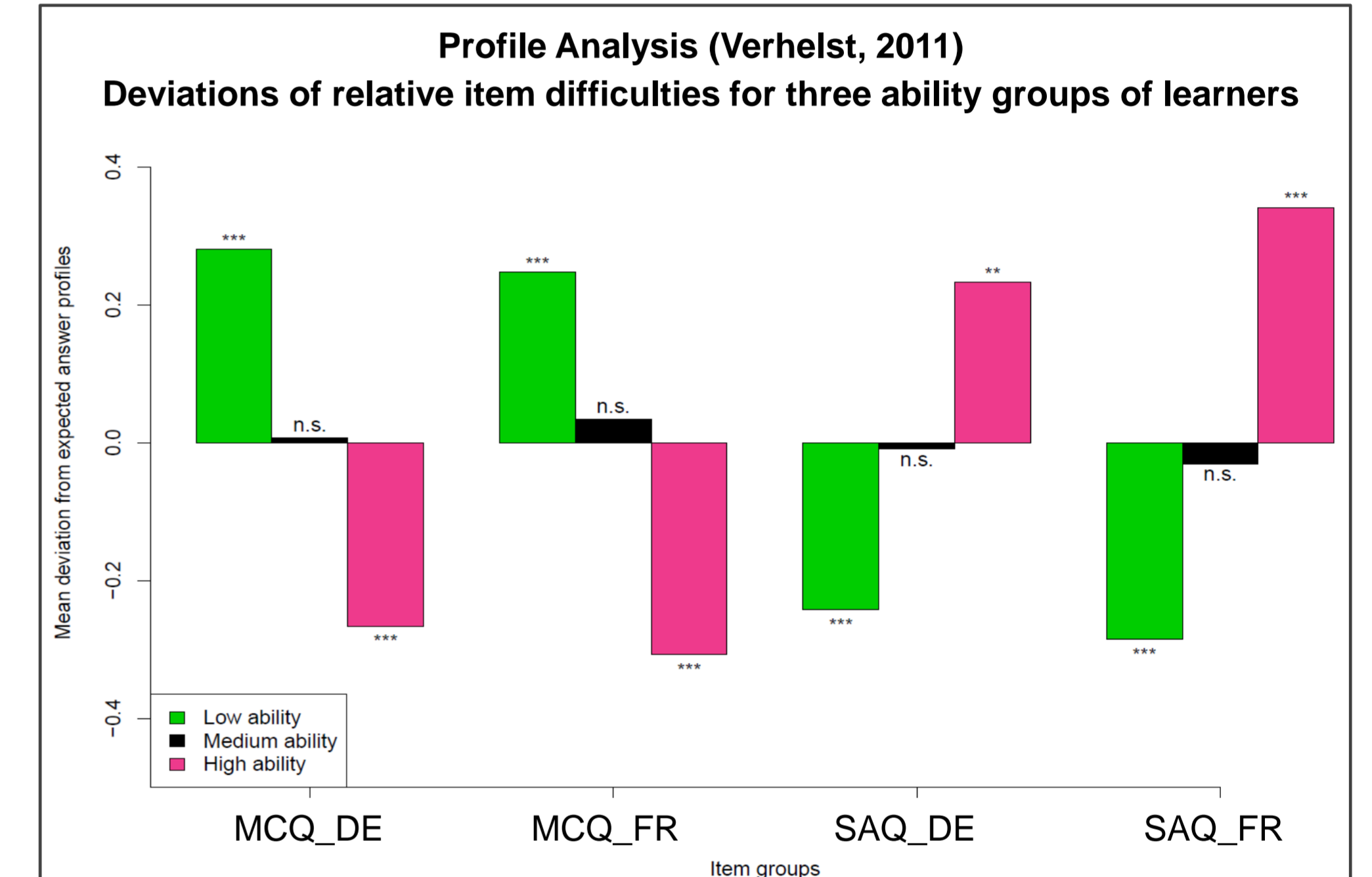
PREDICTORS USED

Student Questionnaire
- Gender
- (Rom, lang, background
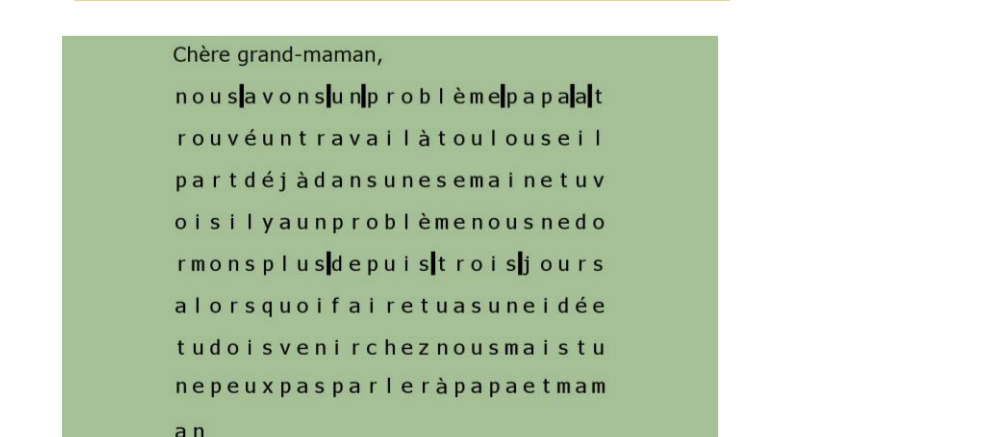- Motivation (enjoyment)
- Motivation (ought)

Backward Digit Span Task
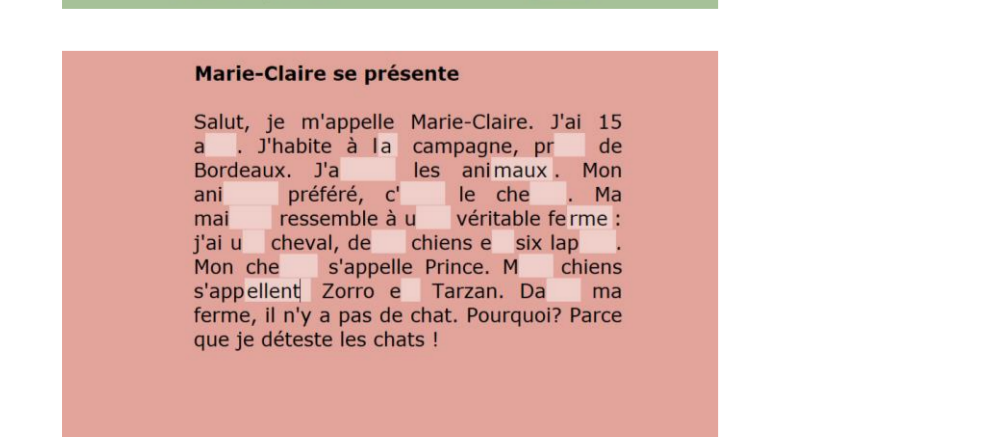Working memory/ processing

Sight-word recognition
Word decoding (gestalt)

Yes-No Task
Vocabulary breadth (receptive)

Text segmentation
Morpho-syntax & integrative measure

C-Test
Integrative measure / written text reconstruction

Predictor matrix was completed through imputation using the Amelia II R package (max. 10.7 % missings)

DOES SUCCESS ON MCQ AND SAQ HAVE THE SAME PREDICTORS? – LATENT REGRESSION ON 2 DIMENSIONS

A 2-dimensional (per item type) model fits better than the 1-dimensional model
```
Mod.2PL.1Dim vs. Mod.2PL.2Dim (dev. Diff.): χ²(10.85, 1), p < 0.001
```

Results of latent ('error-free') regression on 2 dimensions:

Predictors	Predictor type	Dim 1 SAQ	Dim 2 MCQ
Gender: male	dummy	0.095	-0.115
Romance lang. background	dummy	0.512	0.112
Motivation: enjoyment	z-std.	0.181	0.109
Motivation: ought	z-std.	0.038	-0.013
Backward digit span	z-std.	0.150	0.145
Sight-word recognition	z-std.	0.159	0.145
Yes-No Test (recognise word)	z-std.	0.142	0.292
Segmentation task	z-std.	0.406	0.293
C-Test	z-std.	0.221	0.156

Some Observations

- **Known correlates** of better language knowledge predict success on **SAQ** items *particularly well*: Integrative measures, Motivation (enjoyment ≈ intrinsic), and a romance family language background (13.6% of sample).
- The strictly **receptive Yes-No** word recognition test is a better predictor for success on **MCQ**. The possibility of success through **guessing** may be a commonality (despite a correction for guessing made on YNT).

Discussion

- It seems desirable to be able to pinpoint more **specific component knowledge & skills – which ones?**.
- What **item characteristics** should be taken into account for a rigorous **person-item explanatory model?**

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