The Role of Money Context in Math Assessment
An Exploratory Approach

Styliani Politi[a], Steve Bernard[b], Christine Schiltz[a], Philipp Sonnleitner[b]

[a] Cognitive Science and Assessment Institute (COSA)
[b] Luxembourg Centre for Educational Testing (LUCET)
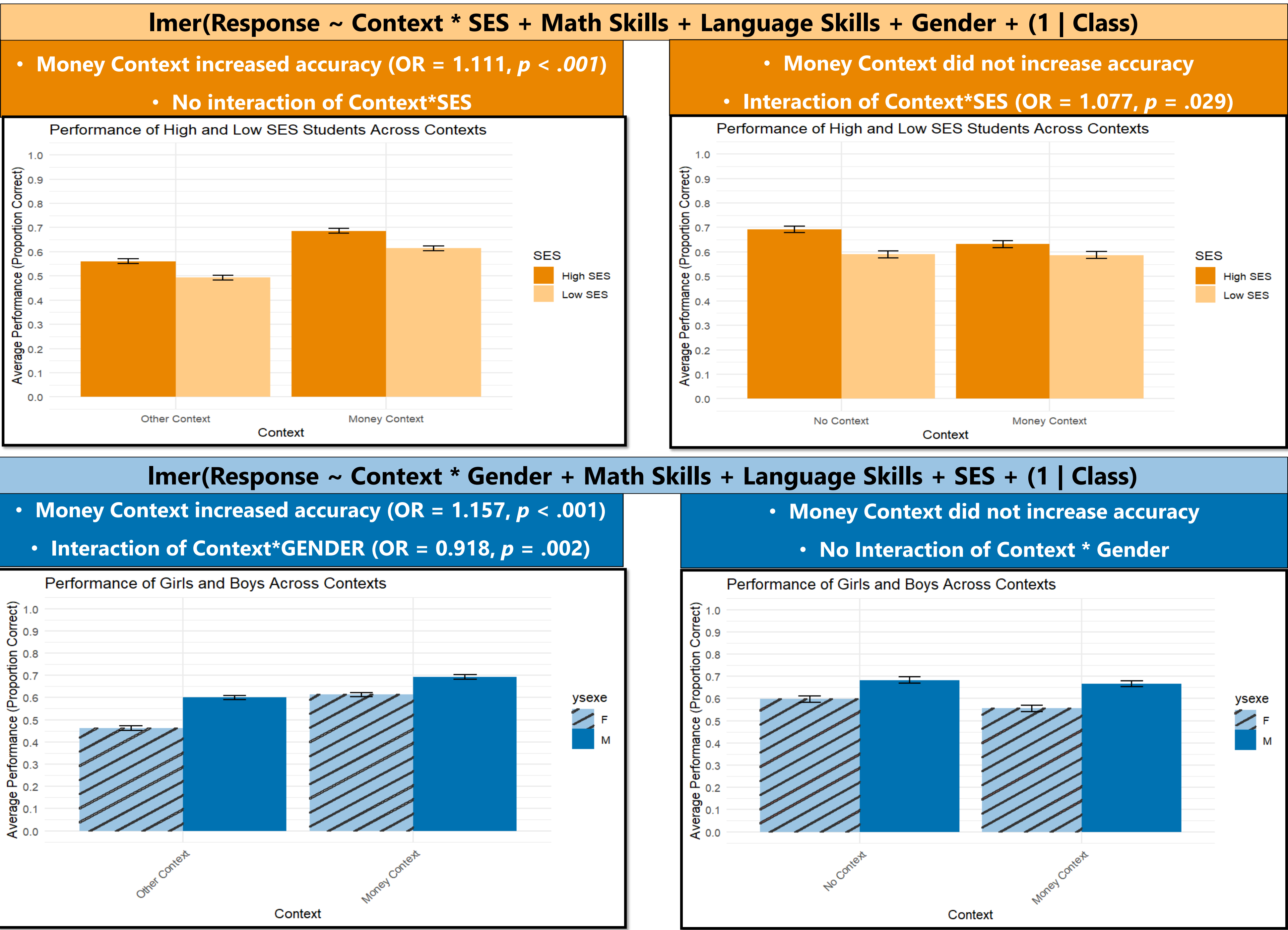
Introduction

- Socioeconomic status and gender consistently predict differences in academic outcomes[1]
- Math assessments may unintentionally favor certain groups due to contextual effects[2]
- The use of money as a context in education is valuable for connecting abstract math concepts to real-world applications. However, given that money exerts a profound influence on people's lives—often being perceived as a necessity in itself[4]—its role in assessment deserves closer exploration.

Aim

- Explore the interplay of student characteristics and item difficulties using difficulty estimates from the 1-PL or Rasch model across various item samples, including those with (1) a money context, (2) other applied context, and (3) without a context.

ÉpStan Preliminary Descriptive Comparisons (items with identical numbers and operations)

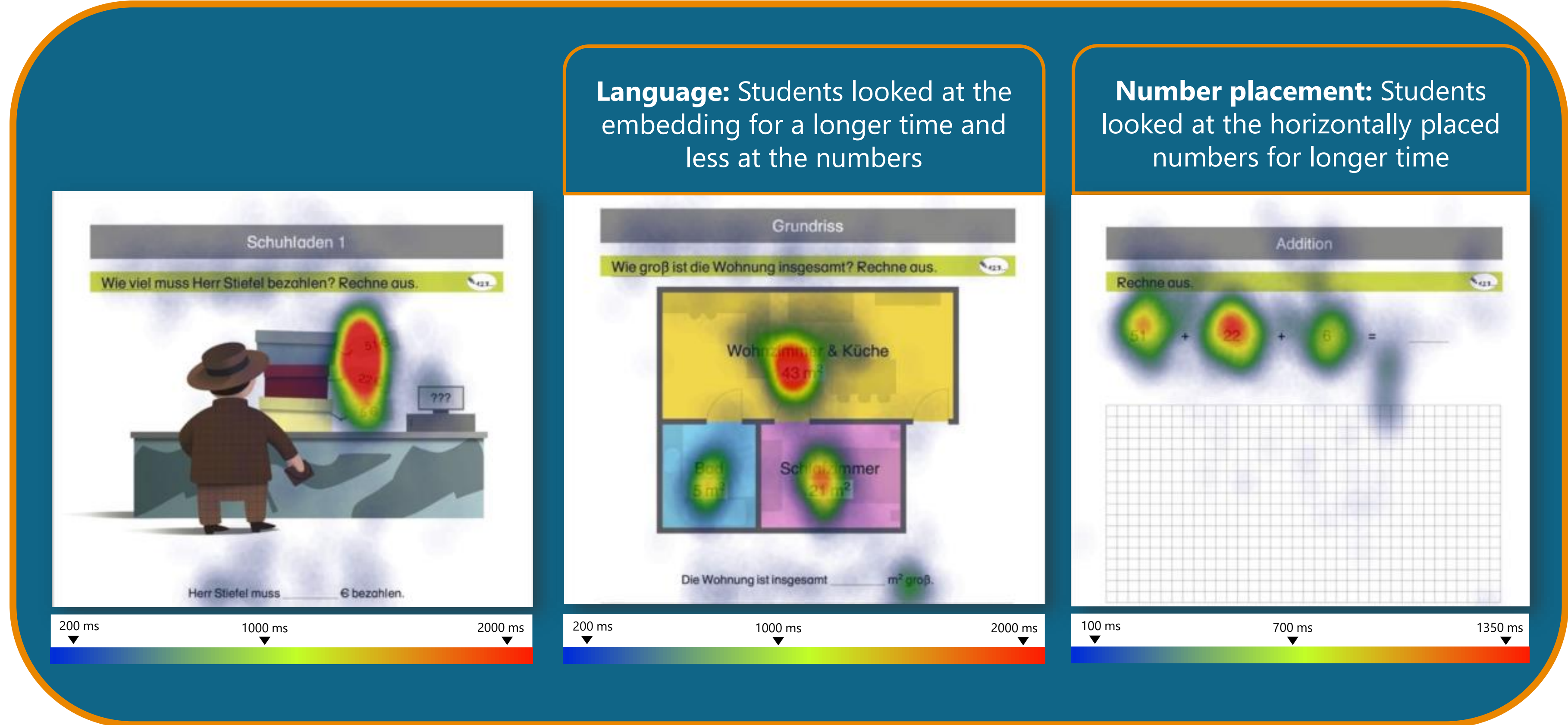- *n* = 4539 (2268 F, 2271 M) matched based on Math and Language Skills (with nearest neighbour)

lmer(Response ~ Context * SES + Math Skills + Language Skills + Gender + (1 | Class))

- **Money Context increased accuracy (OR = 1.111, *p* < .001)**
- **No interaction of Context*SES**

- **Money Context did not increase accuracy**
- **Interaction of Context*SES (OR = 1.077, *p* = .029)**

Money appears to reduce SES differences by increasing the accuracy of low SES students, but other item difficulty factors are still at play

lmer(Response ~ Context * Gender + Math Skills + Language Skills + SES + (1 | Class))

- **Money Context increased accuracy (OR = 1.157, *p* < .001)**
- **Interaction of Context*GENDER (OR = 0.918, *p* = .002)**

- **Money Context did not increase accuracy**
- **No Interaction of Context * Gender**

Money seem to have slightly decreased the chance for boys to answer correctly
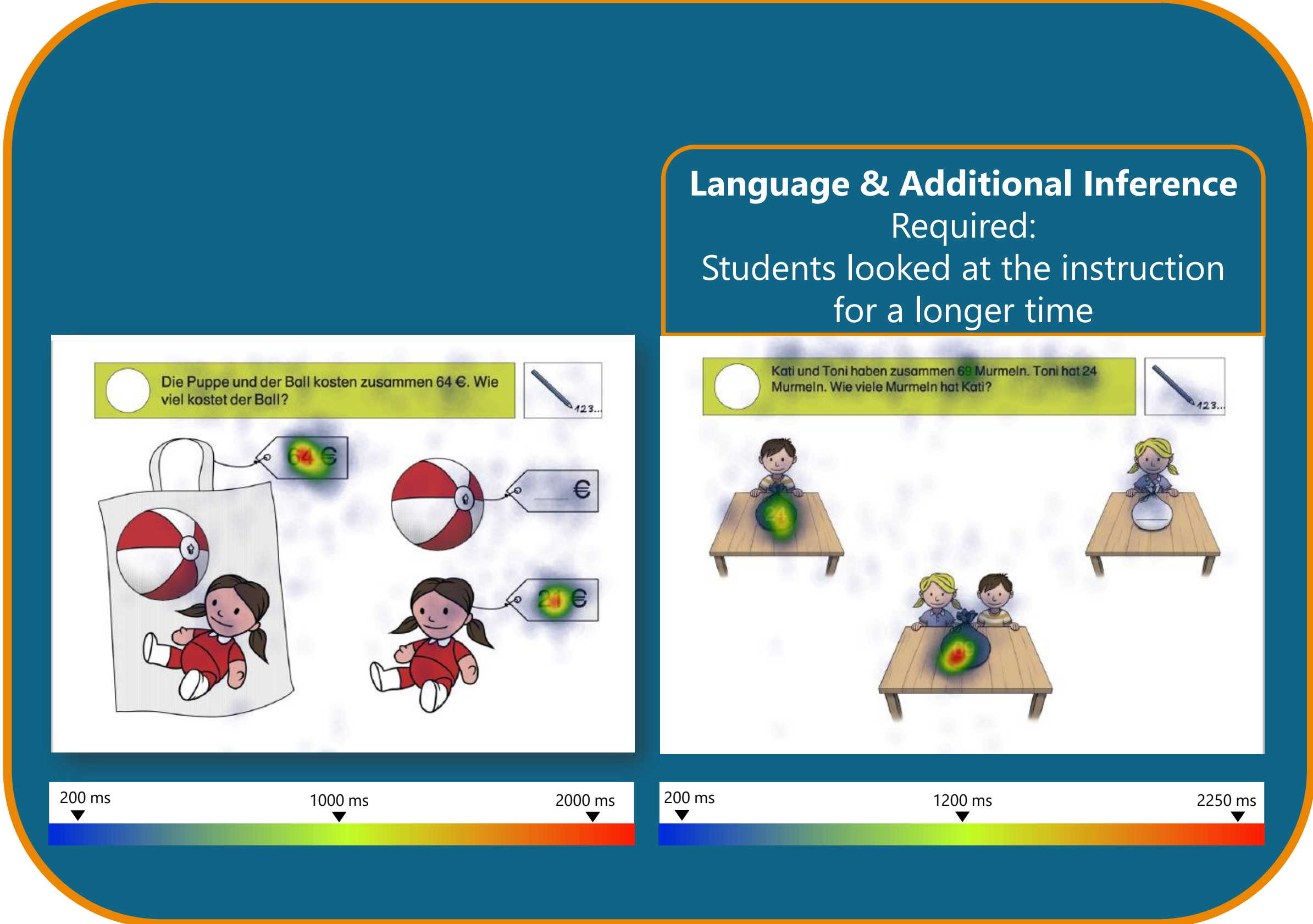
Note. Error bars represent 95% CI

Disentanglement of Money as Context and Item Difficulty Parameters Using Eye-Tracking Data

Comparison of Money Context with Other Context and No Context Items

Language: Students looked at the embedding for a longer time and less at the numbers

Number placement: Students looked at the horizontally placed numbers for longer time

Comparison of Money Context with Other Context

Language & Additional Inference Required: Students looked at the instruction for a longer time

Annotation. The colors show the average fixation time in ms

Conclusions & Further Steps

- Preliminary indications on the role of Money and its' interplay with item difficulty.
- Our next step→ Explore interactions between student characteristics and item difficulty using the Rasch model.
- Our goal: Get some insights into the role of context in assessments and an idea of how money makes the world (of assessment) go round. ☺

References
[1]Guiso et al. (2008); [2]Thomson, (2018); [3]Walker (2011); [4]Lea & Webley (2006)