# Research

The aim of this study is to find a feasable method to determine item discrimination values within the Math Garden to detect deviant items.

**What is the problem**

- Sparse data
- Scaling
- Identifiability

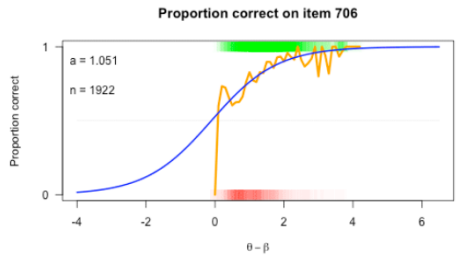
**Pragmatic solution**

So there are some fundamental problems in estimating a. But can we at least have some pragmatic solution?

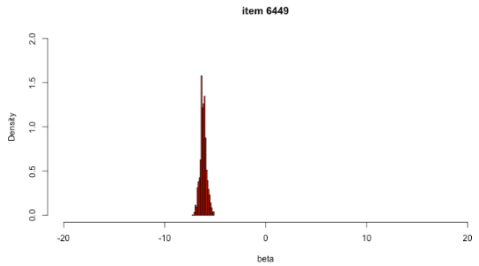
**For fancy visuals see QR code**

https://goo.gl/a6ch6A

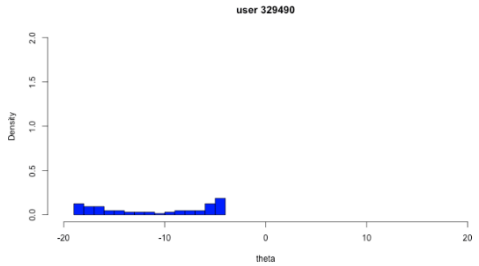
## Discrimination




## Item ratings




## User Ratings




## Method

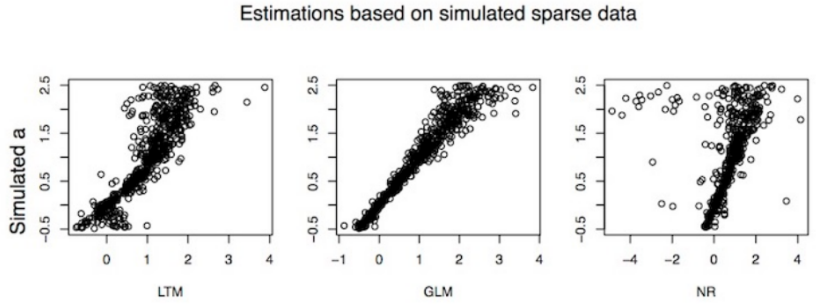
**Simulations**

Simulate responses and response times based on known $\theta$'s, $\beta$'s and $a$-parameters. Look how wel we can recover the $a$-parameter.

- Simulate full data
  - Estimate with LTM
  - GLM
  - Newton-Rapson
- Simulate sparse data
  - LTM
  - GLM
  - Newton-Rapson

Look at BIAS and SEM.

## Proliminary Results




## TO-DO

- $a = 1$
- $a \sim U(0, 3)$
- $a \sim U(-.5, 3)$
- Apply NR in Math Garden
- Inactivate bad items
- Apply to real data