



# Research

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

## What is the problem

- Sparse data
- Scaling
- Identifiability

## Pragmatic solution

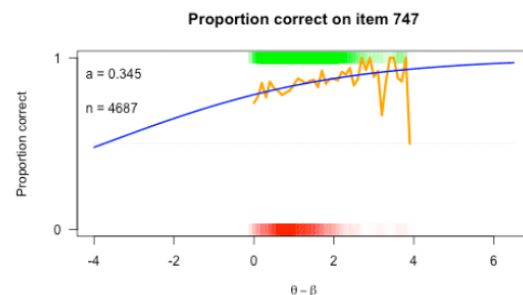
So there are some fundamental problems in estimating  $a$ . But can we at least have some pragmatic solution?

For fancy visuals see QR code

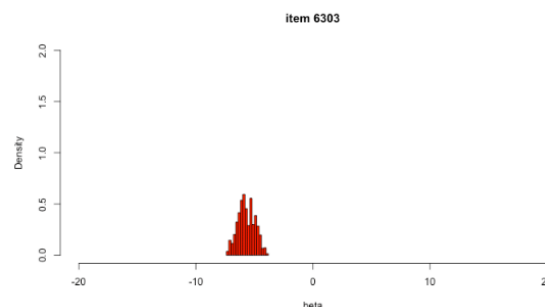


<https://goo.gl/a6ch6A>

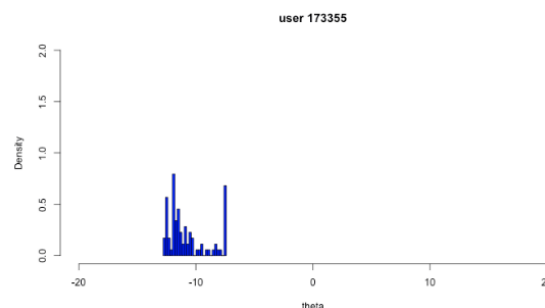
## Discrimination



## Item ratings



## User Ratings



## Method

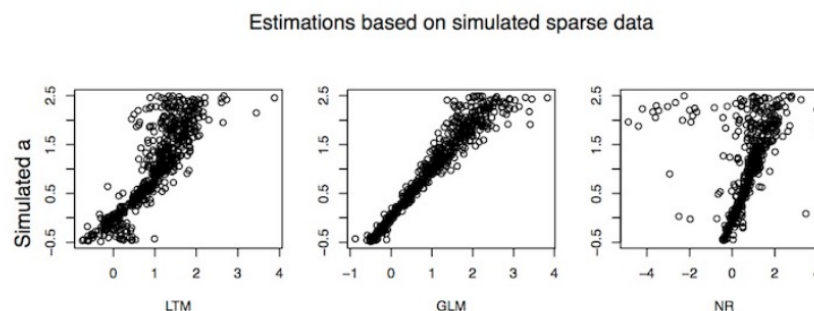
### Simulations

Simulate responses and response times based on known  $\theta$ 's,  $\beta$ 's and  $a$ -parameters. Look how well 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.

## Preliminary 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