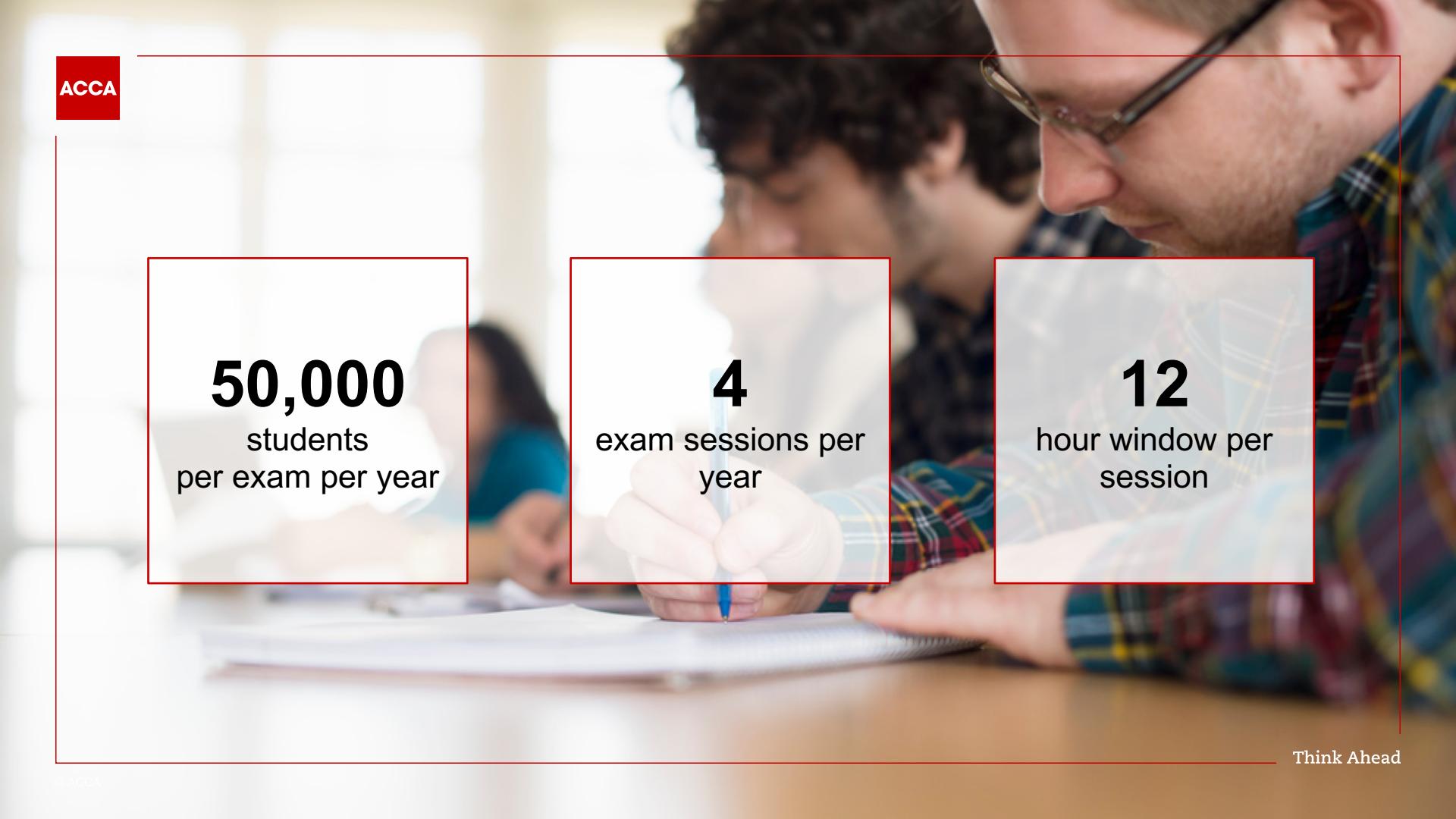


Tom Laycock
ACCA

Rasch analysis using R & Shiny

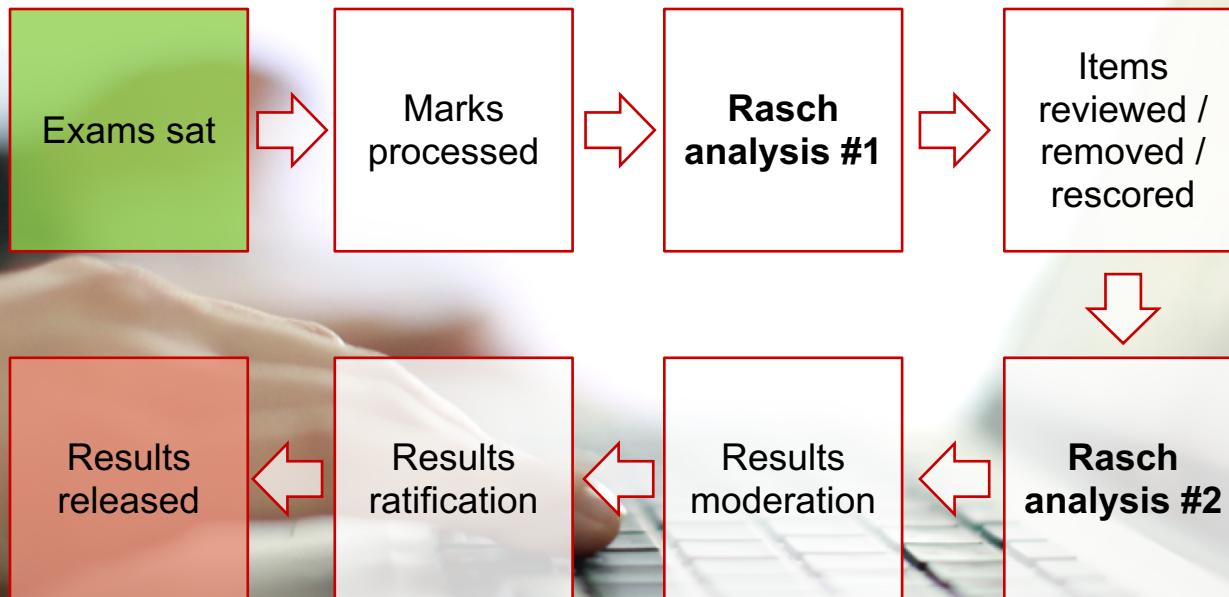
A blurred background photograph of several students sitting at desks, looking down and writing in notebooks, suggesting a classroom or exam setting.

50,000
students
per exam per year

4
exam sessions per
year

12
hour window per
session

Results process



Main challenges

Time

Not much of it



Efficiency

Need lots of it



Human error

Want none of it

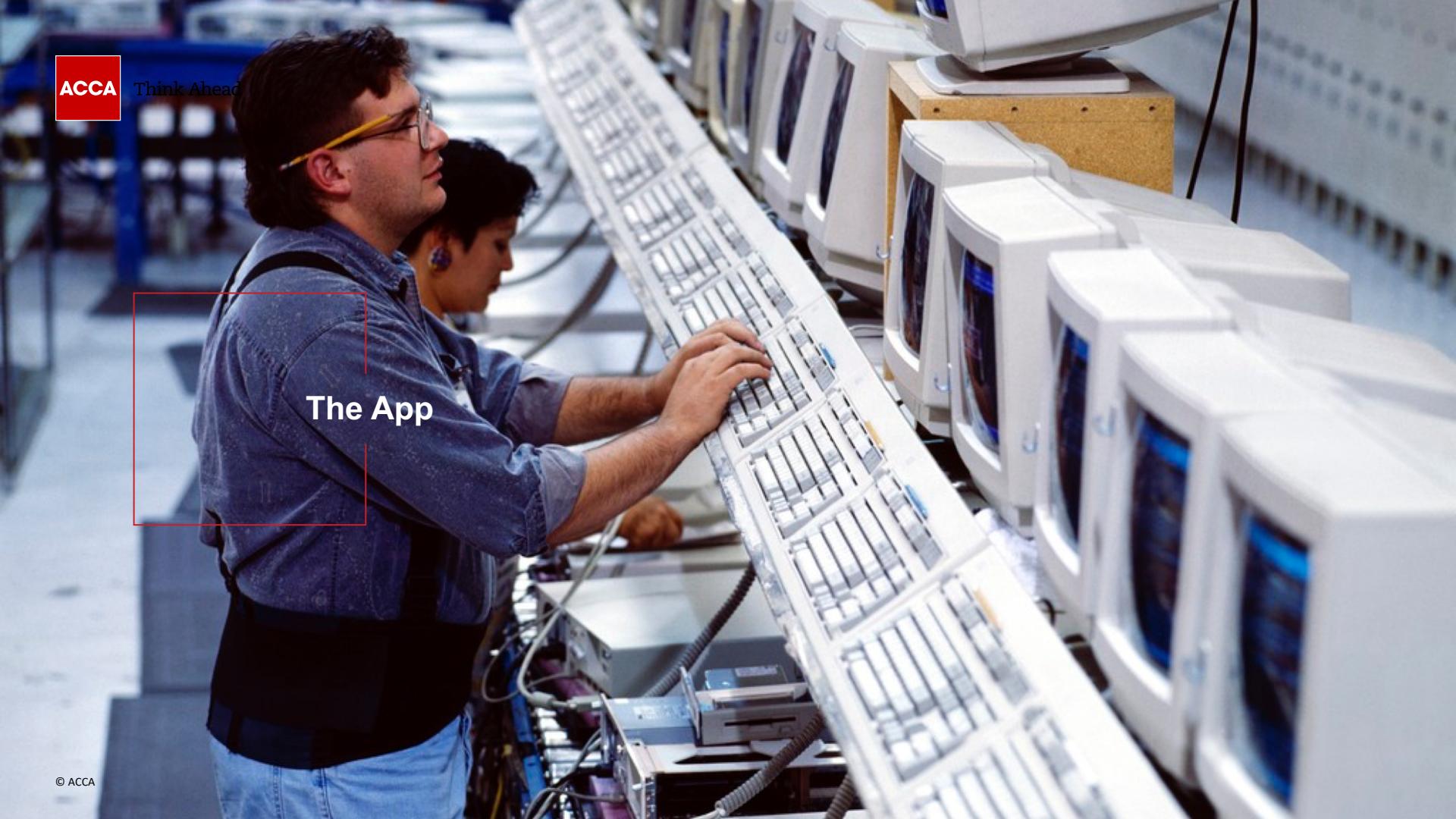




- Programming language and environment for statistical computing and graphics
- Open-source
- Community supported



- An R package to build interactive apps straight from R
- No knowledge of web development required



The App

Upload data

Use this screen to upload the response data.

Step 1: Retrieve response data

Retrieve the response data below. Ensure that the data is fully loaded before proceeding to the next step.

Session**Exam****Variant****Database****Upload status**

There is no response data loaded.

Wright map

Difficulty vs. Fit

Ordered difficulty

Local dependence

Wright map

The Wright map shows item difficulties and candidate abilities on the same measurement scale providing a comparison of candidates and items to better understand how appropriately the exam measured.

Type

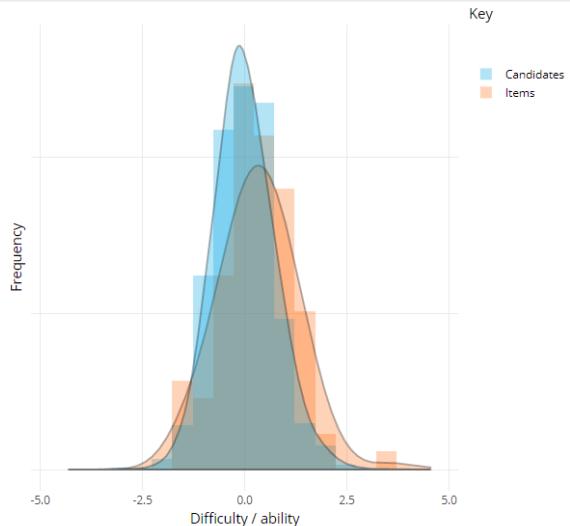
- Histogram
- Frequency curve
- Both

Smoothing (frequency curve only)**Bin width****Position**

- Identity
- Dodge

Opacity**Display**

- Standard
- Flipped



Wright map

Difficulty vs. Fit

Ordered difficulty

Local dependence

Wright map

The Wright map shows item difficulties and candidate abilities on the same measurement scale, providing a comparison of candidates and items to better understand how appropriately the exam measured.

Type

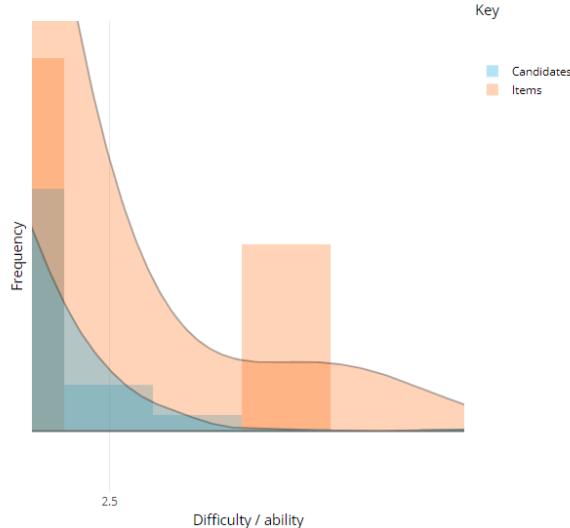
- Histogram
- Frequency curve
- Both

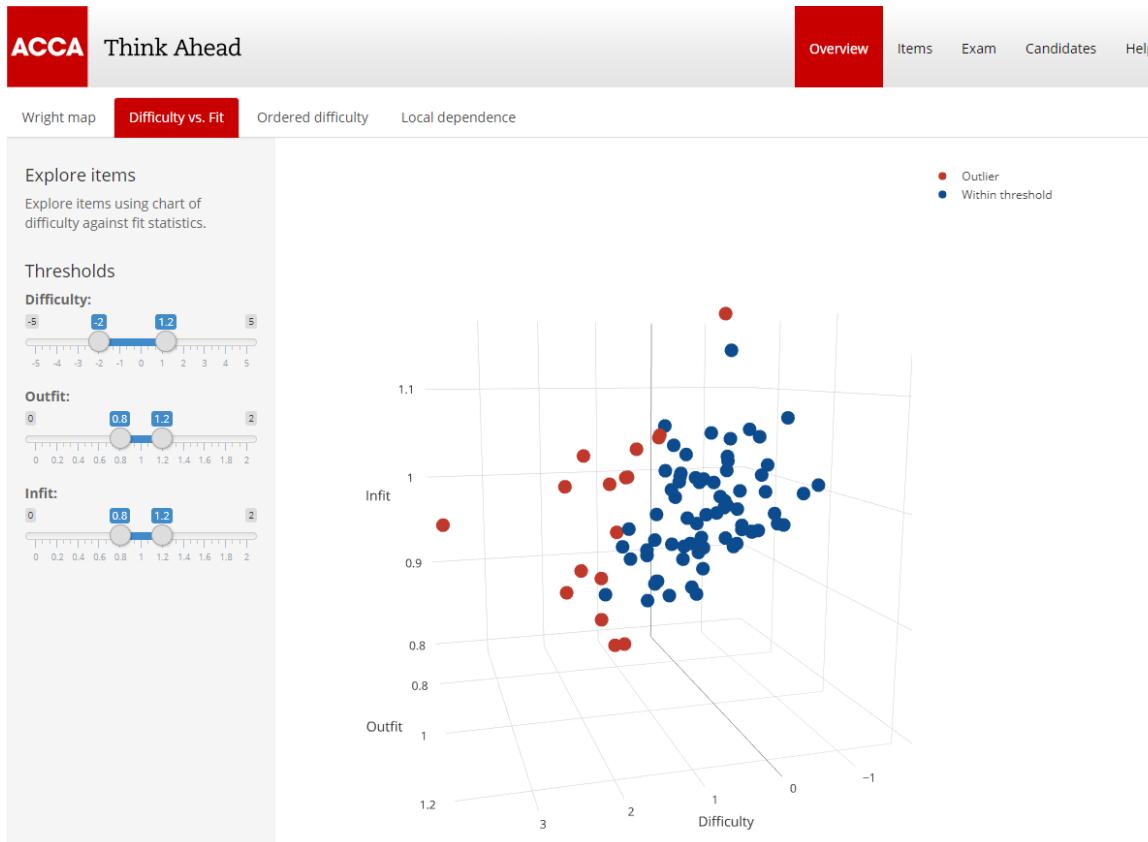
Smoothing (frequency curve only)**Bin width****Position**

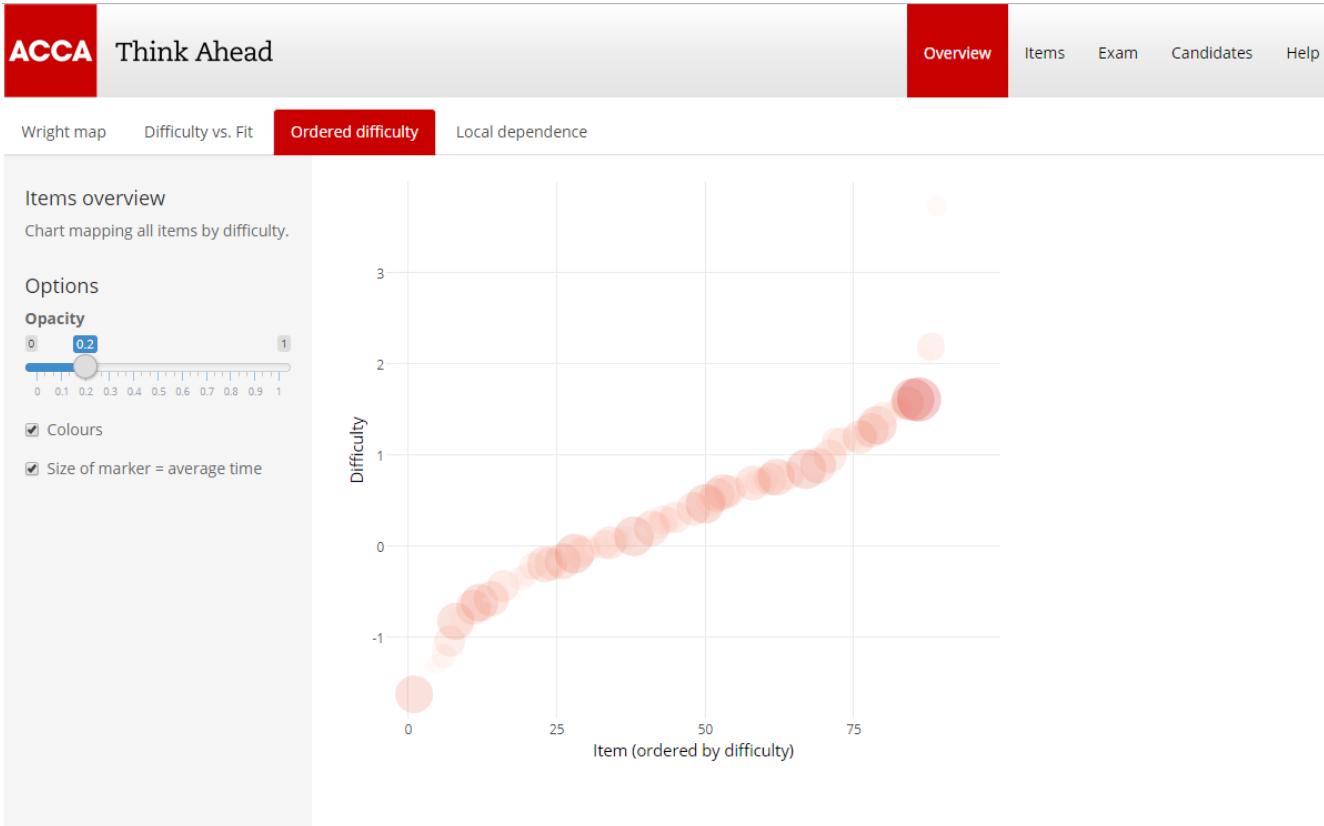
- Identity
- Dodge

Opacity**Display**

- Standard
- Flipped







Item Characteristics

Differential Item Functioning

Export

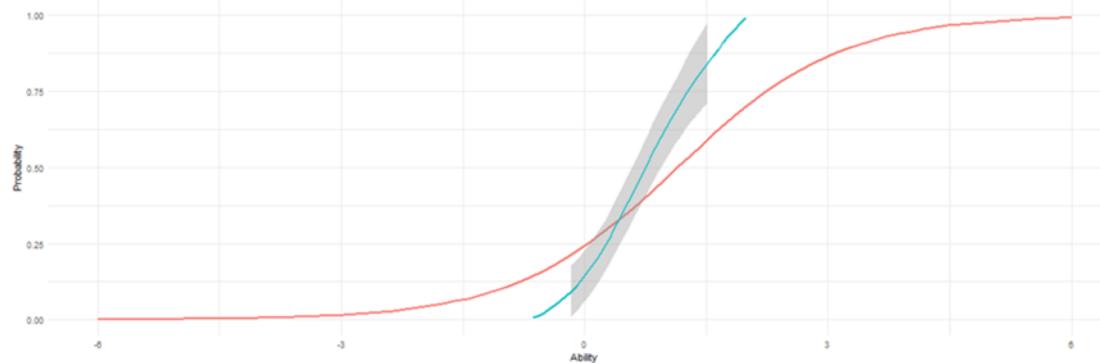
Item statistics

Question:

Next

Previous

Item characteristic curve



Options

Smoothing (observed data):

 0
 0.3
 2 Expected Observed

Concluding remarks

- ✓ Automate retrieving and restructuring data
- ✓ Can design the application to meet exact needs
- ✓ Reduce reliance on IT department
- ✗ Support: on our own to debug and fix
- ✗ Need to be comfortable with R coding

R packages used

- IDE: **RStudio**
- Building the app: **shiny**
- Restructuring data: **reshape2** and **dplyr**
- Rasch analysis: **TAM**
- Static charts: **ggplot2**
- Interactive charts: **plotly**
- Reading/writing Excel files: **xlsx**
- Javascript operations: **shinyjs**
- Connecting / querying database: **RJDBC** and **rJava**



A photograph showing a person's legs and feet standing near a large glass window. Two dark-colored suitcases are on the floor next to them. The floor is made of light-colored tiles. The window looks out onto a bright, possibly outdoor or very well-lit interior space.

Thank you

Tom Laycock
tom.laycock@accaglobal.com