World Health Organization

Item Thresholds

Rasch Technical Training 5

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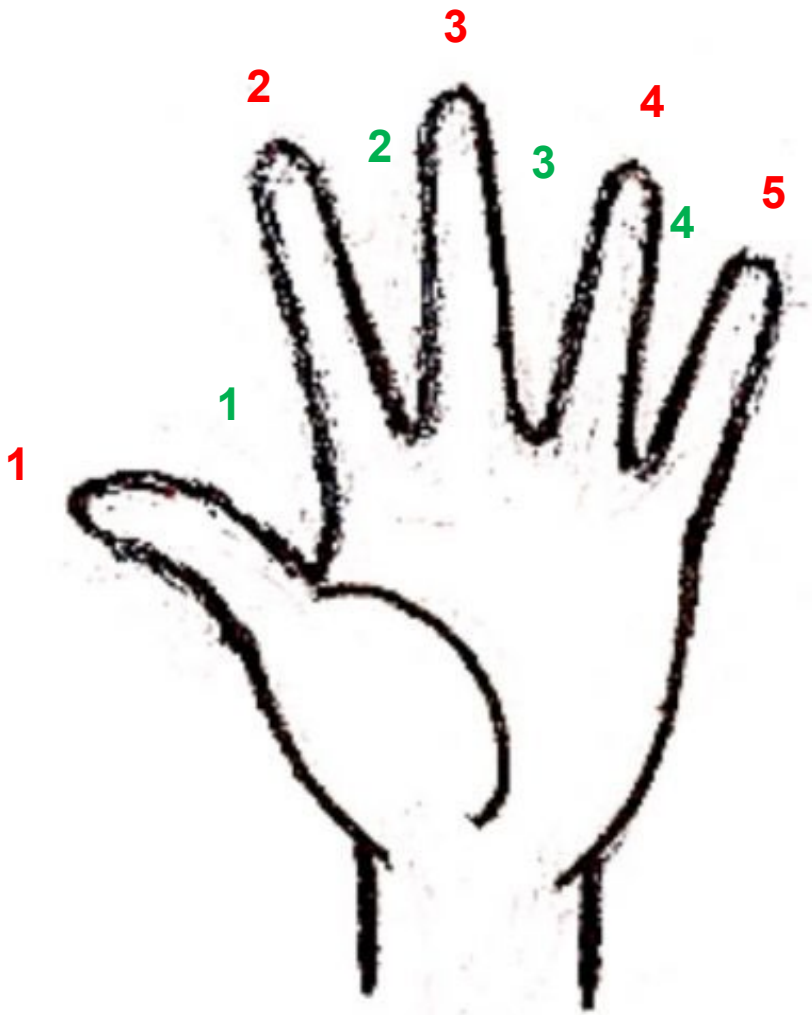
Difficulty Thresholds

Difficulty thresholds are the equal probability points which separate two adjacent response levels in a questionnaire item.

Difficulty Thresholds

Example: A questionnaire with **5 response options** would have **4 thresholds**.

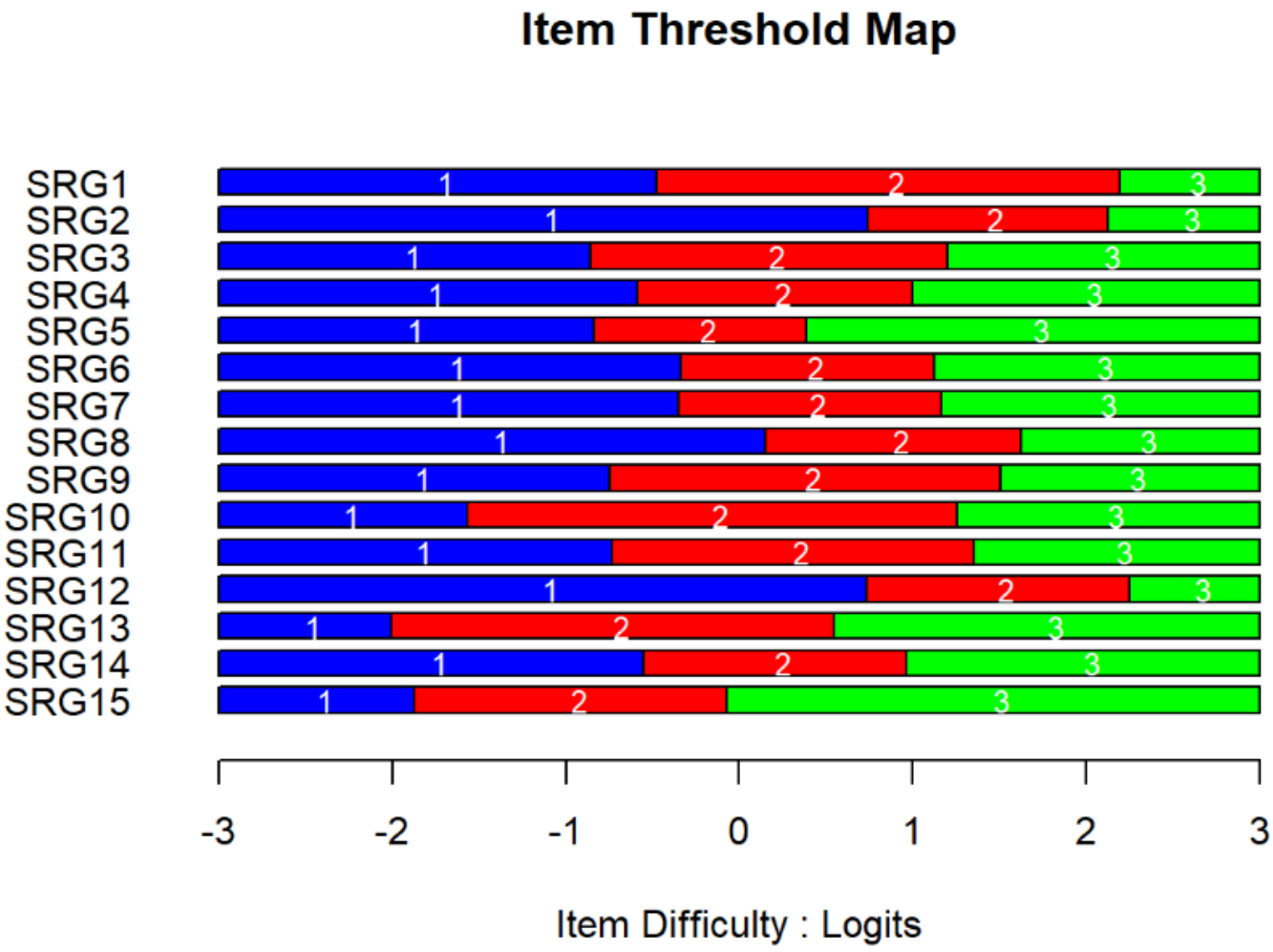


Difficulty Thresholds

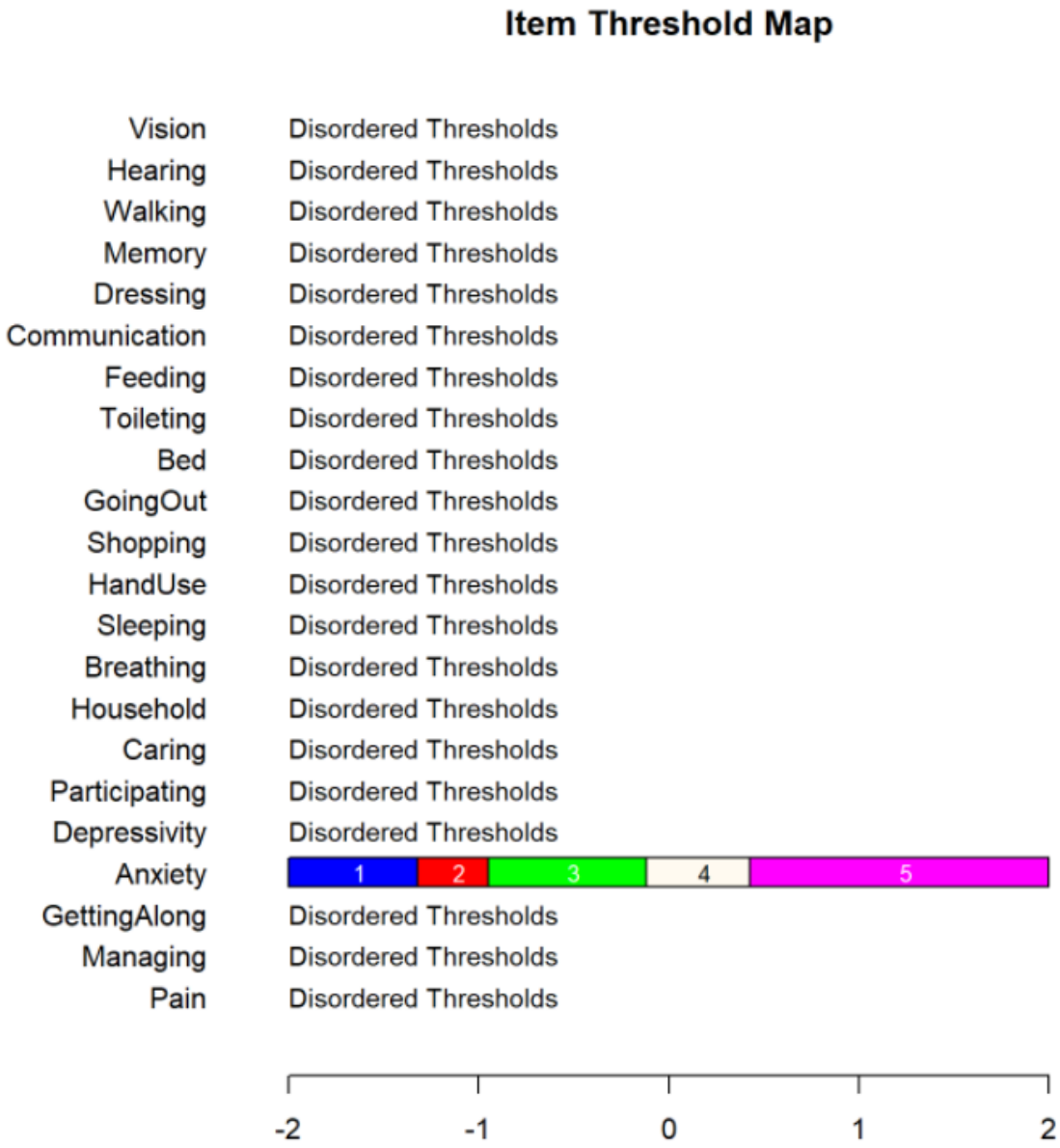
The PCM, partial credit model allows non-equidistant thresholds.

Reversing and disordering of thresholds can happen for example with many response options, with vaguely defined response options, participants with unexpected response behaviors...

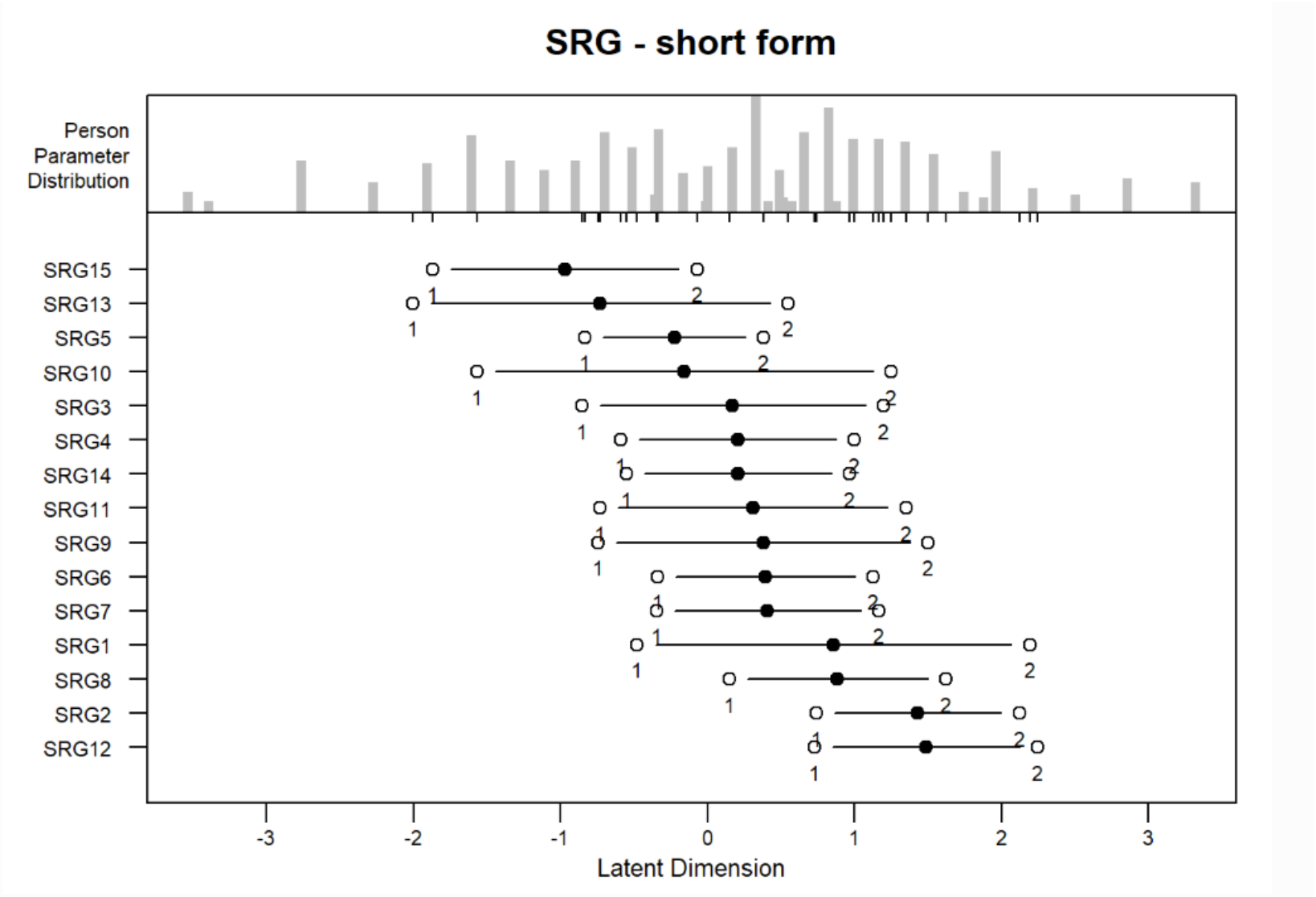
Example for Ordered Thresholds



Example for Disordered Thresholds

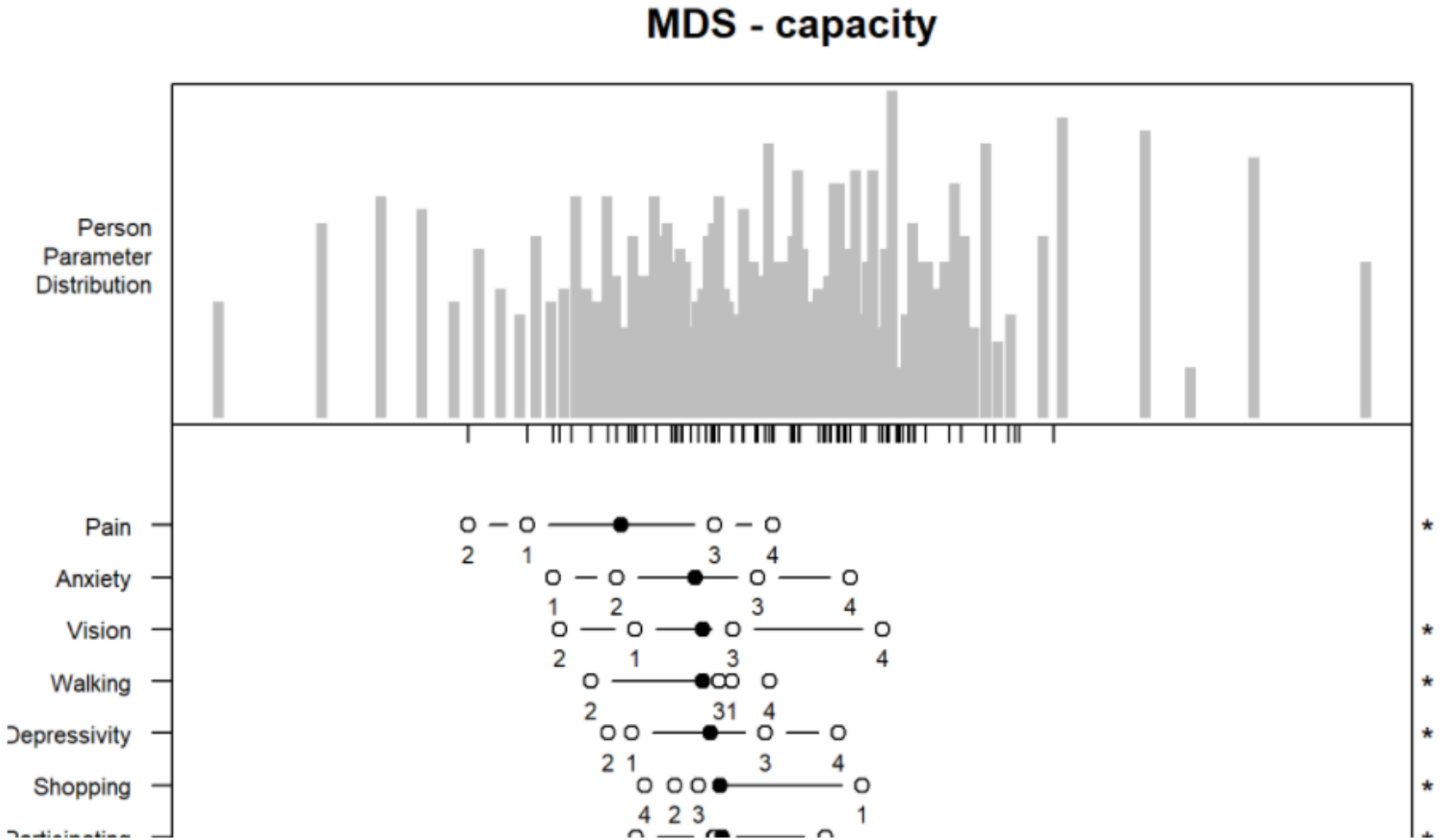


Example for Ordered Thresholds:
Person Item Map

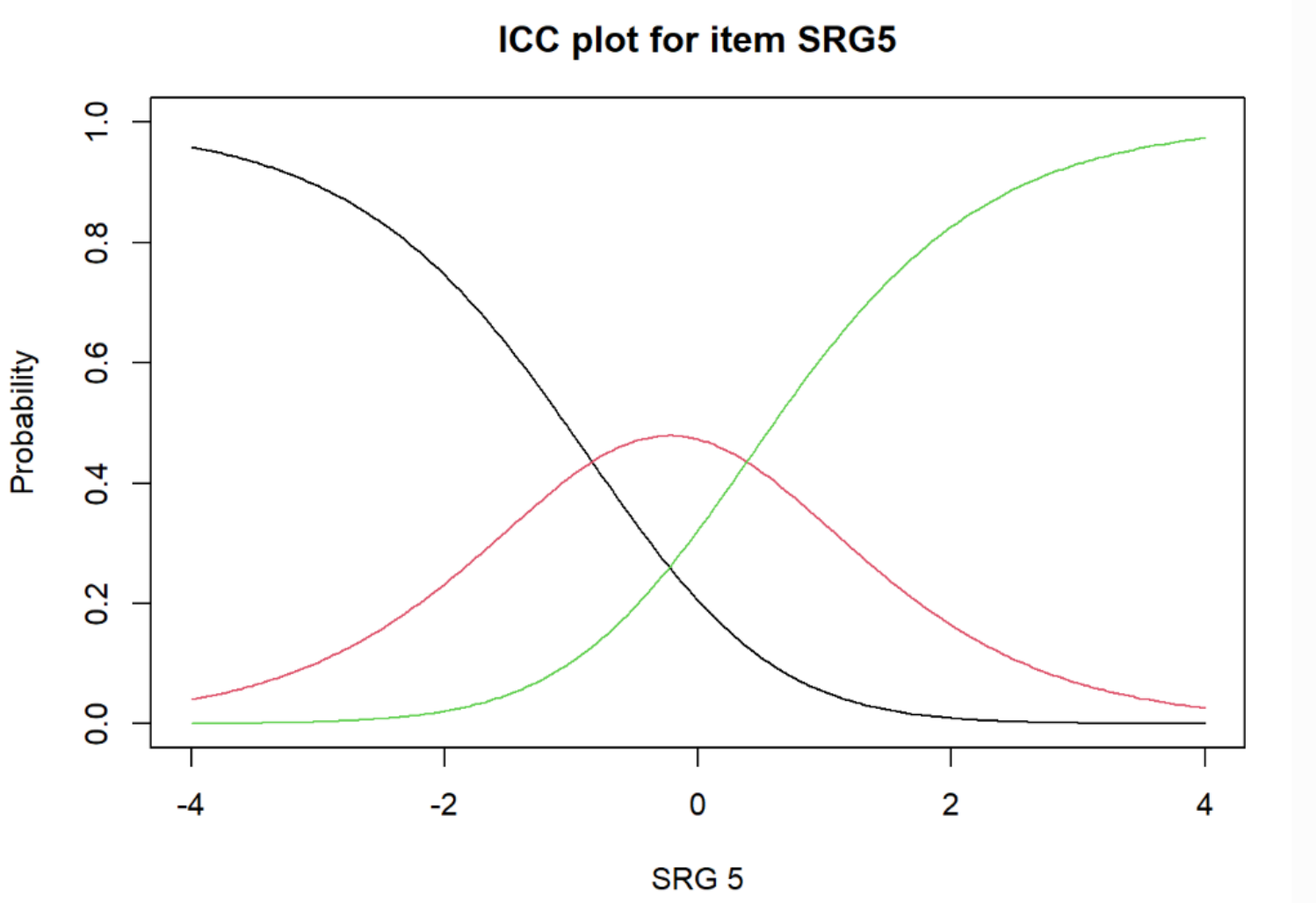


Example for Disordered Thresholds

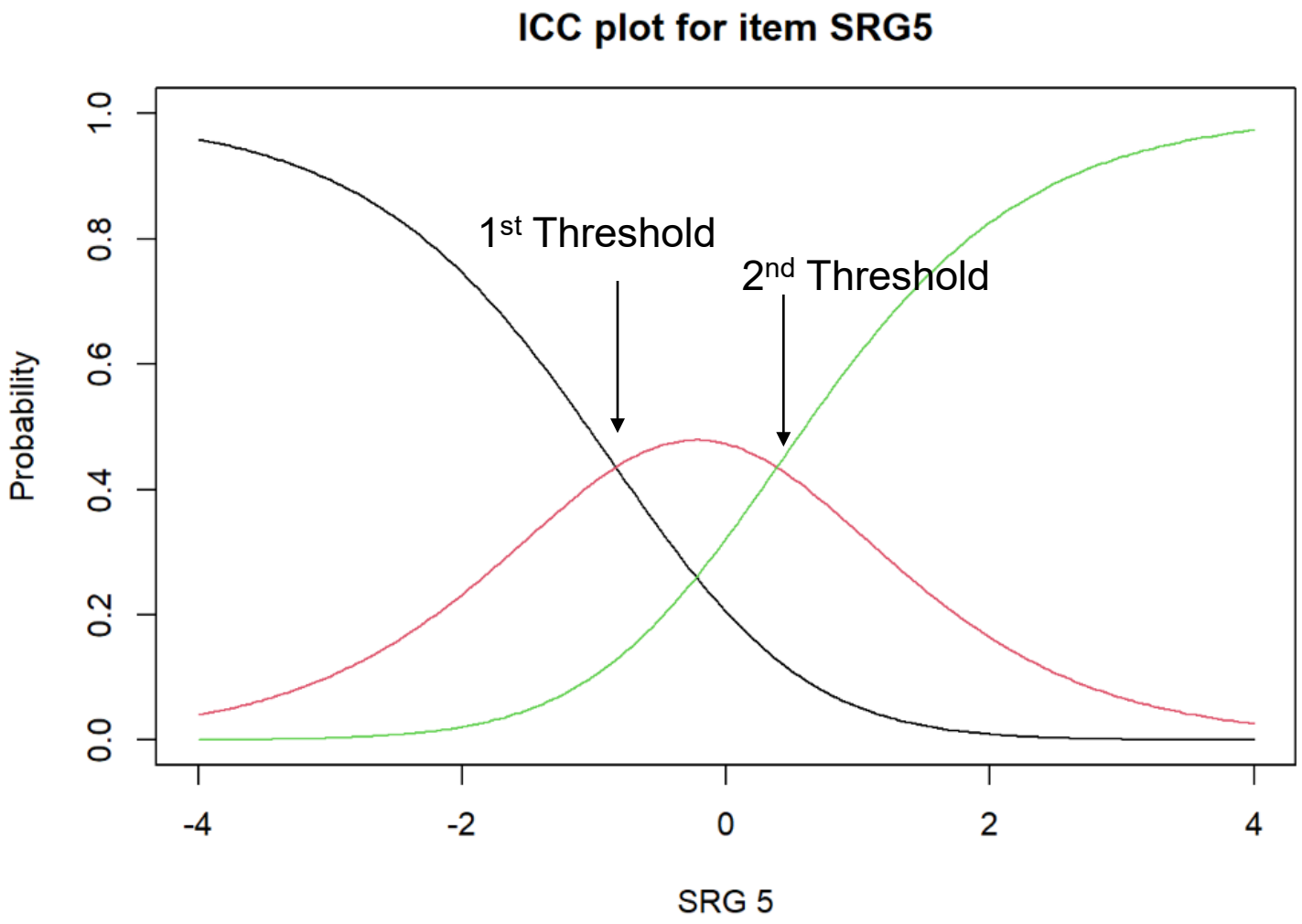
Person Item Map



Example for Ordered Thresholds

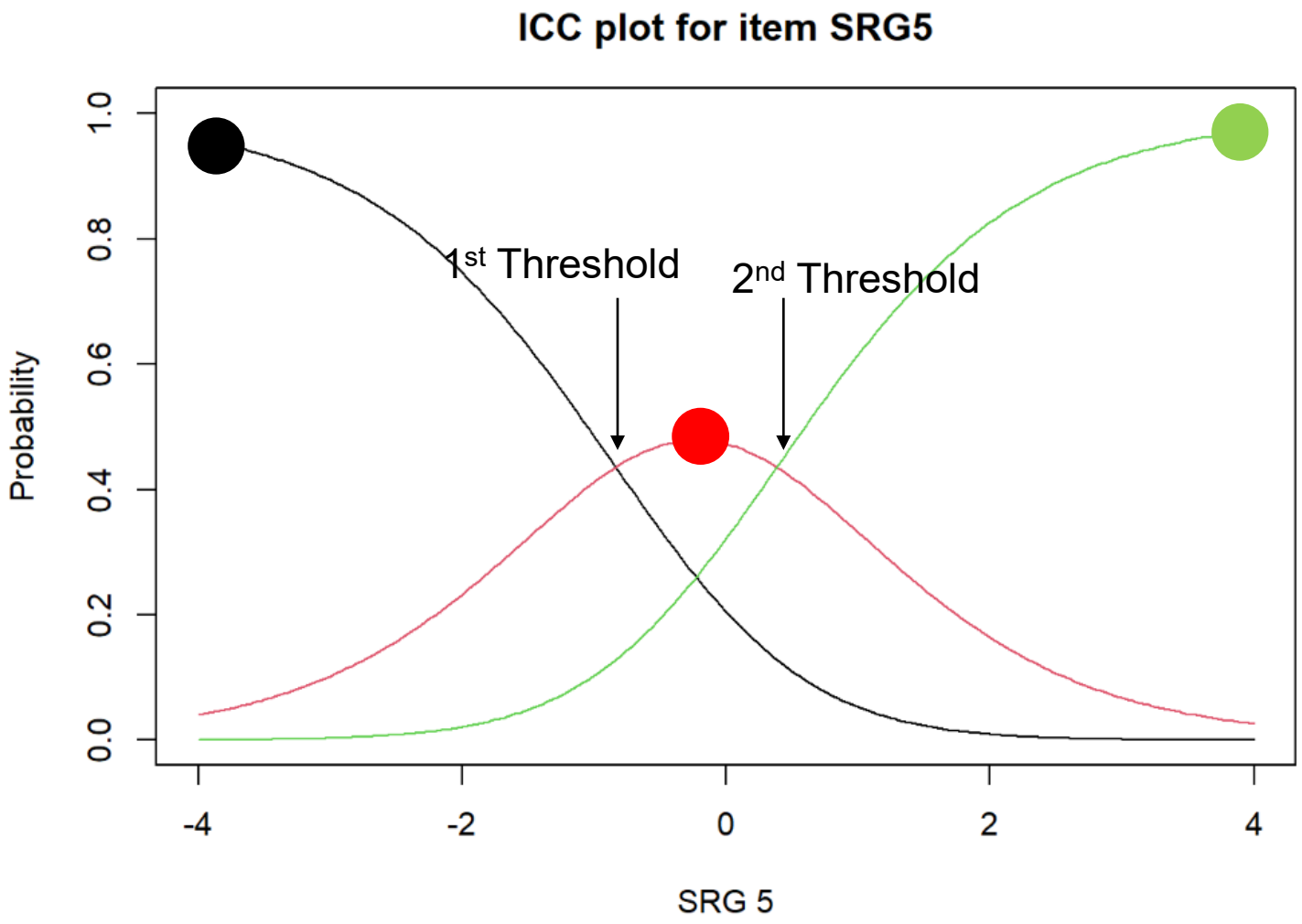


Example for Ordered Thresholds



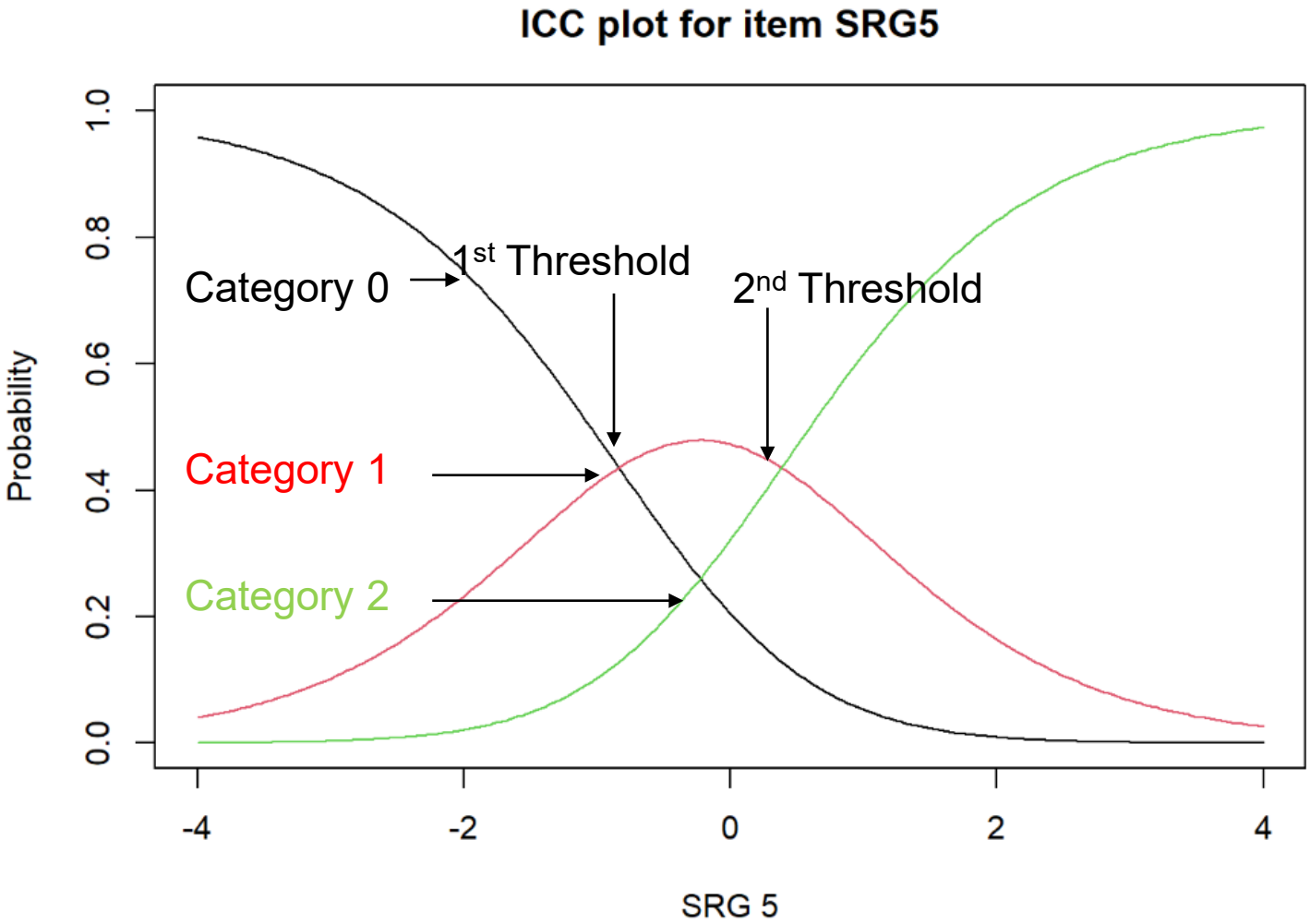
Example for Ordered Thresholds

With many curves it becomes more difficult.
1. Approach: The top of all item category curves are visible

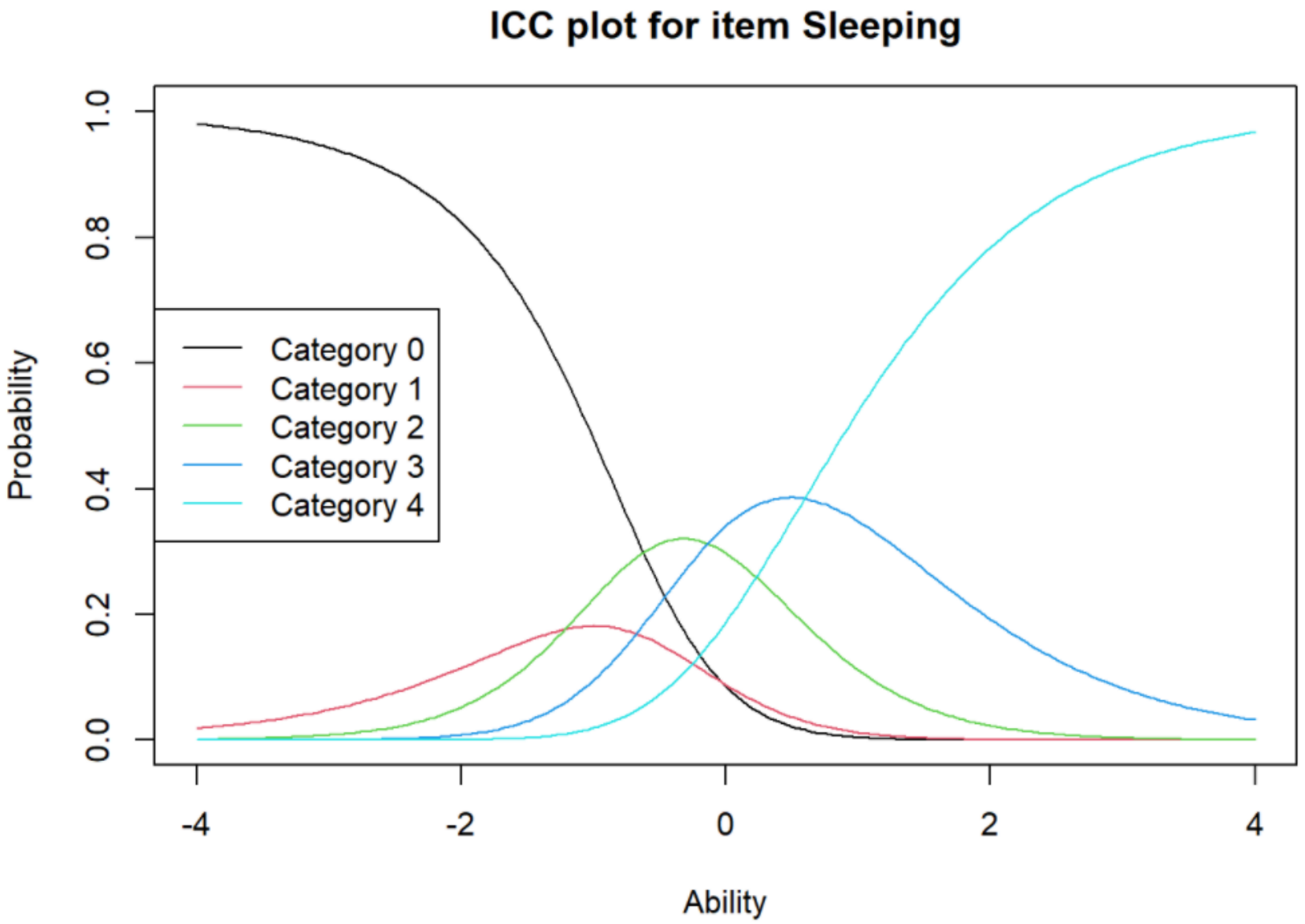


Example for Ordered Thresholds

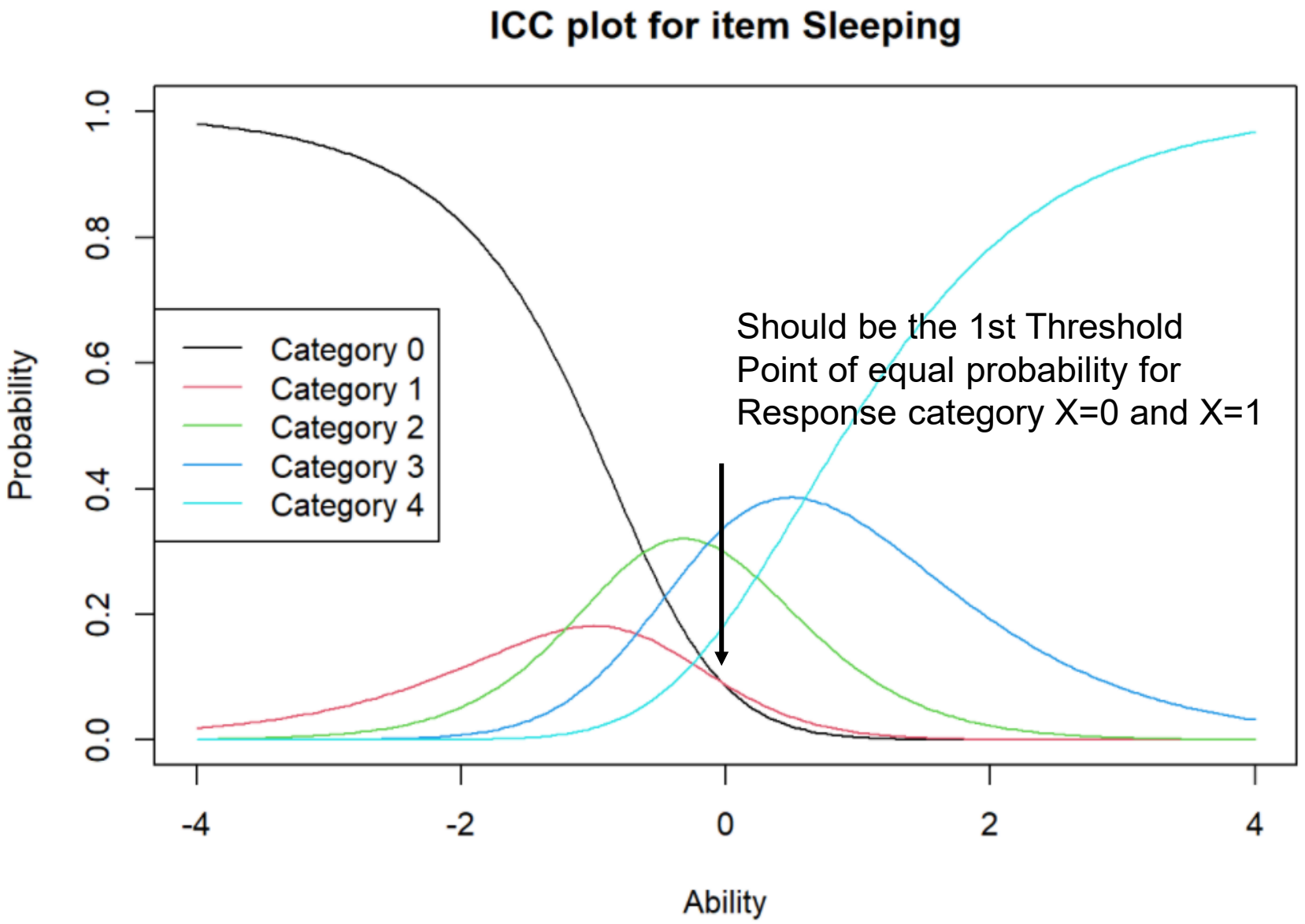
With many curves it becomes more difficult.
2. Approach: The alignment of the intersections on the black line is ordered by response category.



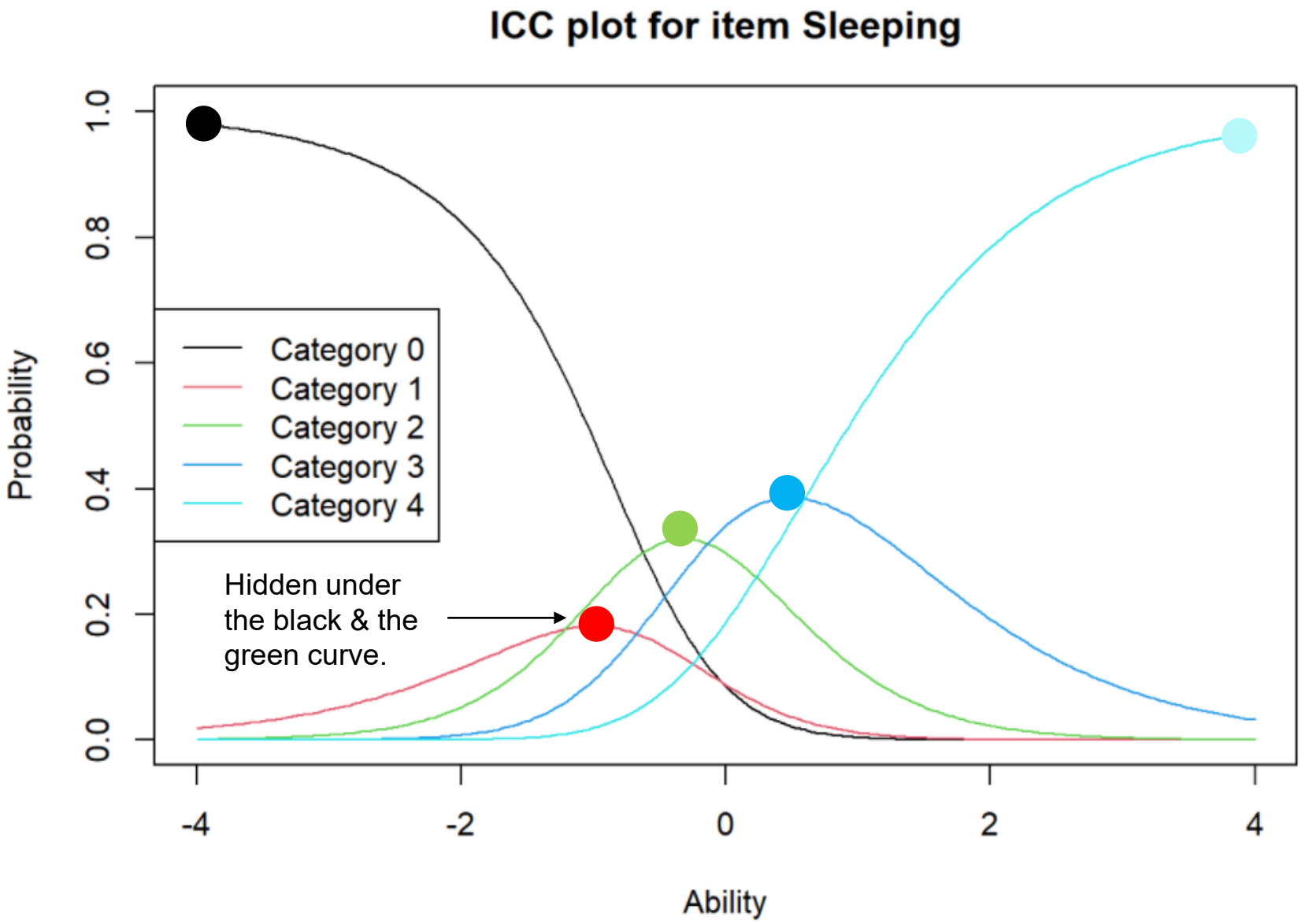
Example for Disordered Thresholds



Example for Disordered Thresholds



Example for Disordered Thresholds



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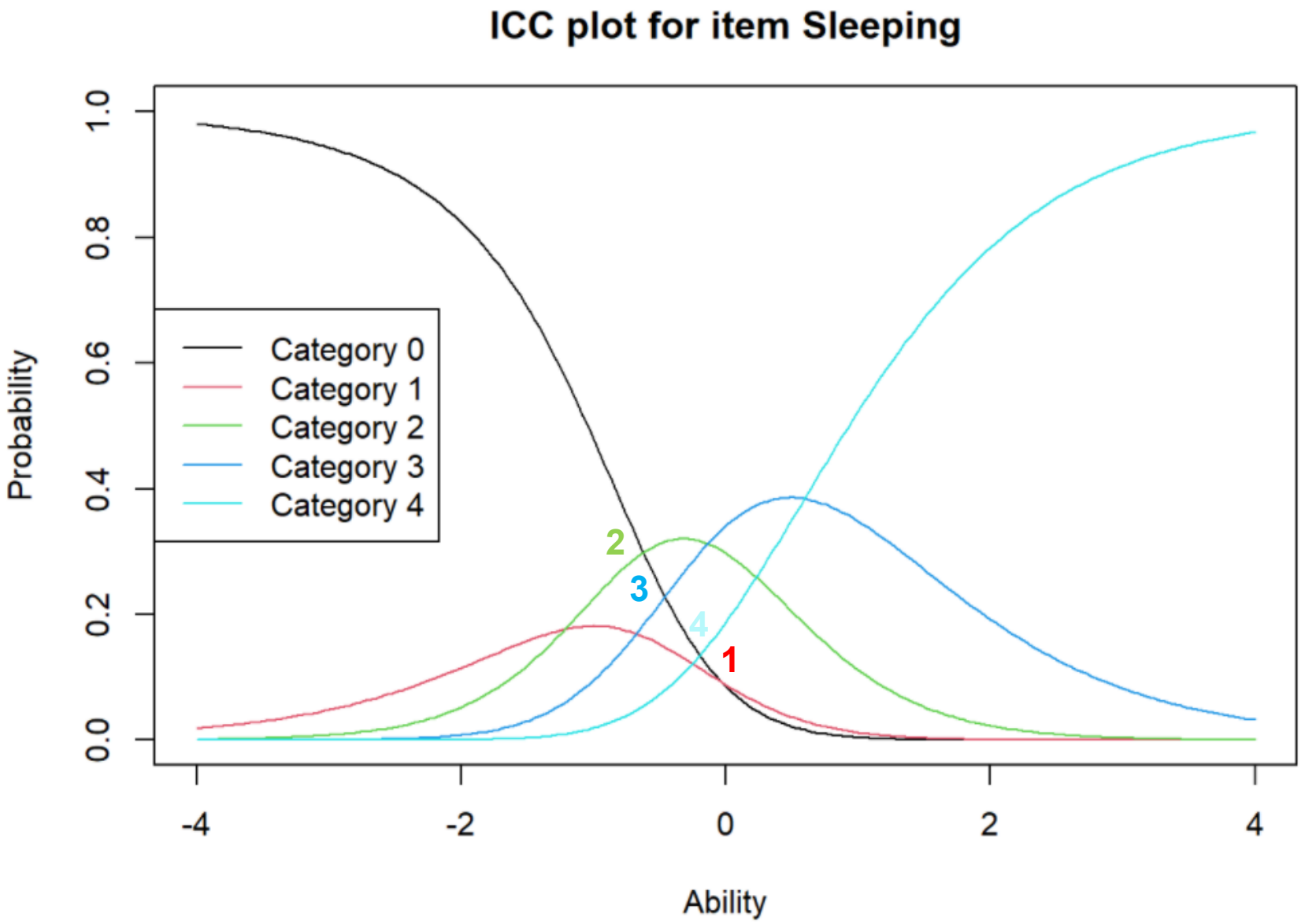

Solving Disordered Thresholds

Disordered response thresholds indicate that the model cannot distinguish between response categories as expected.

When the analysis output shows that thresholds are disordered, the item should be recoded.

Note that, only adjacent response categories are collapsed.

Example :

Item original coding: 01234

Output shows that the first and second threshold that are reversed.

Item could be recoded: 00123 or also 01123.

Solving Disordered Thresholds

- The Threshold Map gives an impression on **how extensive** the disordering is.
- The ICC curves and the Person-Item map allow to see **where** thresholds are reversed.
- Observing **response frequencies** can also be helpful to decide which way to collapse when the figures do not allow a clear decision.

Typically, one would not collapse the disordered response options of all items in one step.

Starting with the item(s) showing the worst item fit statistics and then proceed stepwise. Sometimes solving disordering in some items improves the ordering of other items.

In some circumstances, where disordering affects an entire scale with same or similar disordering across items, a «global» strategy is better. All items are then recoded at once in a same way.

A certain amount of trial and error is sometimes necessary to come to a solution.

Let’s go to R-Studio

Open the R-Script TT5_Rscript.r that is in Github.

Exercise

The threshold diagnostics and item collapsing are now illustrated with an exercise on a scale with more issues.

Using the MDS capacity scale (description in the Sampling.html file) investigate step by step the item thresholds with the method(s) of your choice.

What do you notice?

Do the items work as expected?

Try out response collapsing to solve the disordering…